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The Public Lighting Tables of the American Meter Company will be found in the page advertisement of that Company.

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[OFFICIAL NOTICE.]

Second Annual Meeting, American Gas Institute.

AMERICAN GAS INSTITUTE,
OFFICE OF THE SECRETARY,
NEW ALBANY, IND., Sept. 11, 1907.

To the Members, American Gas Institute: The second annual meeting of the American Gas Institute will be held at Washington, D. C., October 16, 17 and 18, and will be called to order by the President, Walton Clark, of Philadelphia. The New Willard Hotel has been chosen as headquarters, and the sessions will be held in the auditorium thereof. The Ins itute will be formally welcomed to Washington by the Honorable H. B. F. MacFarland, President of the Board of Commissioners, District of Columbia.

The following schedule of rates offered by various hotels in Washington are submitted:

		Without Bath — One Person. Single Room.	Without Bath — One Person. Double Room.	Without Bath — Two Persons. Double Room.	Without Bath — Two Persons. Extra Large Room.	With Bath — One Person. Single Room.	With Bath — One Person. Double Room.	With Bath — Two Persons. Double Room.	With Bath — Two Persons. Extra Large Room.
New Willard.	E	$2.50 up.	$3.00 up	....	$4.00 up.	$3.50 up.	$4.00 up.	$5.00 up.	$5.50 up.
Raleigh.....	E	2.00	3.00	4.00	4.00	3.00	4.00	4.00	6.00
		..	....	...	....	3.50		6.00	up.
Occidental.....	E	Suites, 2 bedrooms, Parlor and bath, $4 and $5							
Shoreham....	E	2.00	3.00	4.00	5.00	3.00	4.00	5.00	7.00
	A	4.00	5.00	8.00	9.00	5.00	6.00	9.00	11.00
Arlington....	E	2.00	....	4.00	4.00	3.00	...	5.00	5.00
	A	4.00	....	4.00	8.00	5.00	....	9.00	9.00
Normandie...	E	1.50	2.00	2.00	2.50	2.00	3.00	4.00	4.00
	A	3.00	3.50	5.00	6.00	3.50	5.00	8.00	8.00
Riggs House..	A	3.00	3.50	6.00	7.00	4.00	5.00	8.00	10.00
Grafton.....	A	3.00	3.50	6.00	....	5.00	6.00	8.00	....
		....	5.00	8.00	....	....	....	9.00	....
Cochran.....	A	....	....	.. ..	....	....	4.00	7.00	....
Metropolitan..	E	1.00	2.00	2.00	3.00	2.00	2.50	4.00	6.00
		...	....	...	....	...	3.00	.	up
	A	2.50	3.00	5.00	6.00	3.50	4.00	7.00	8.00 up
Ebbitt	A	3.00	....	6.00	....	5.00	6.00	10.00	....
		4.00	....	up	....	....	....	....	....
St. James. ...	E	1.00	2.50	3.00	....	2.50	3.00	4.00	....
		2.00	4.00	4.00	....	3.00	4.00	6.00	....
National.. ...	E	1.00	2.00	2.50	3.00	2.00	....	4.00	....
		. .	. .	....		2.50	....	...	....
		2.50	3.00	5.00	6.00	3.50	....	7.00	....
		....	....	....	....	4.00	....	....	....
Howard House	E	2.00	....	2.00	6.00	....	....	....	....
		2.00	....	2.50	....	....	....	....	....

E—European Plan. A—American Plan.

The named papers have been secured by the President for presentation to the Institute, together with the reports of the following committees:

"Depreciation;" by Mr. A. C. Humphreys.

Communication from New England Association; by Its Committee on Uniform Accounting and Depreciation.

Report of Committee on Methods of Taking Candle Power; by Mr. Wm. H. Gartley, Chairman, Philadelphia, Pa.

"The Obligations Imposed by the Possession of a Franchise;" by Mr. Chas. H. Dickey.

Report of Public Policy Committee; Mr. E. G. Cowdery, Chairman.

Report of Committee on Making of Rates and Additional System of Costs; Mr. W. H. Gardiner, Chairman.

Report of Committee on Economic Balance between Calorific Value and Candle Power; Mr. Thos. D. Miller, Chairman.

Report of Committee on Board of Revision; Mr. J. D. Shattuck, Chairman.

"Instructions for Operating Recuperative Benches;" by Mr. W. A. Baehr.

"Experiments in Carbonization;" by Mr. W. H. Fulweiler.

Lecture on "Electrolysis;" by Prof. A. F. Ganz.

LIBRARY OF CONGRESS. SEP - 1907 SMITHSONIAN DEPOSIT.

Report of Committee on Electrolysis; Mr. A. G. Glasgow, Chairman.

Report of Committee on Pipe Standards; Mr. Walton Forstall, Chairman.

Experience with Dipping Meters; reports from Baltimore, by Mr. George Beadenkopf. Also reports from Philadelphia and Savannah.

Report on "A" Meter Results from Philadelphia and Kansas City.

Report of Committee on Uniformity of Meters; Mr. Charles H. Dickey, Chairman.

"Air Blast Gas Appliances," by Messrs. W. K. Eavenson, Philip Cross and W. H. Allen.

Wrinkle Department, by the Editors.

The Passenger Associations will not consider rates on the certificate plan until after their next meeting, which convenes September 10th. Many State Legislatures having enacted the 2-cent rate, the Commissioner of the Trunk Line Association writes as follows:

143 LIBERTY ST., N. Y., July 25th, 1907.

MR. JAS. W. DUNBAR, Sec. American Gas Institute, New Albany, Ind.:

Dear Sir—Referring to your letter of the 15th, beg to advise that, on account of the unsettled rate conditions, the Trunk Lines feel they cannot consider the question of reduced fares for meetings or conventions to be held after the month of September, until their next meeting, which will convene on September 10th, after which we will promptly communicate to you decision reached respecting your application.

Yours truly,

(Signed) L. P. BARNES, Commissioner.

The Secretary will be pleased to mail applications to those who may wish to become members of the Institute. Further detailed information in reference to the convention will be forthcoming.

Yours truly, JAMES W. DUNBAR, Secretary.

[NOTICE.]

Fifteenth Meeting, Pacific Coast Gas Association.

PACIFIC COAST GAS ASSOCIATION,
OFFICE OF THE SECRETARY,
SAN FRANCISCO, CAL., Aug. 17, 1907.

To the Members of the Pacific Coast Gas Association: As the date[1] of our fifteenth convention is drawing near, I take this means of notifying you of the following arrangements that have been made, in order that you can make your plans accordingly:

Railroad Rates.—The Southern Pacific Railroad Company has named a special rate of full fare and a third, from all points in California to Santa Cruz and return. Instructions have been issued to their Agents to put this rate into effect 10 days prior to the meeting, and the same will remain in force 48 hours after adjournment of the convention on Thursday, September 19th; in other words, up to the Saturday night following the close of the meeting. At the time of purchasing your tickets you should notify the Agent that you are to attend the Association meeting, and at that time you will be furnished with a receipt certificate, which certificate will have to be countersigned by the Secretary of the Association or his representative in in order to secure your return ticket from Santa Cruz. You should buy your ticket for one way only, and for which you will be required to pay full rate, but your return ticket, after the receipt certificate has been countersigned by the Secretary of the Association, will be furnished you at one-third of the regular fare. The above arrangement will also apply to tickets purchased at Reno, Nev., by members of the Association as outlined.

Papers.—While I am not prepared at the present writing to advise you of the titles of the various papers to be presented before the convention, still they will be up to the usual standard and no doubt bring forth discussions of much merit; suffice it to say that all who attend the coming convention will return to their "camping ground, wiser and better men," for all those who visit beautiful Santa Cruz never have an idle moment, and if they do 'tis their own fault.

I am inclosing you herewith postal card, which you will kindly fill out and return at the earliest possible moment, in order that accommodations can be reserved at once, as simultaneously with the convention there will be a big automobile meet, and this, with all the other attractions, will tend to draw a greater crowd than usual.

Make your arrangements at once, and give your wife, children and sweethearts something to look forward to by getting in line for the banner meeting of the Association. Don't fail to advise me promptly of your intentions. Yours very truly, JOHN A. BRITTON, Sec'y.

1. The Convention will be called to order Tuesday, the 17th,

BRIEFLY TOLD.

THE FIFTEENTH MEETING OF THE MICHIGAN GAS ASSOCIATION.—As was intimated last week might be the case, Secretary Ewing's official programme, respecting the exact carding of the Battle Creek sessions of the Michigan Gas Association, was just a day late in coming to hand. A glance over it, however, shows that our predictions were, if anything, rather under than over in forecasting the success that would be recorded concerning it. The meeting (its days are Wednesday, Thursday and Friday of this week) was to be held in the handsome Assemblyrooms of the Battle Creek Business Men's Association, on the fifth floor of the Post building. This arrangement is an excellent one, for headquarters were to be in the Post Tavern, directly "over the way." The regular business listings were excellent, for besides the inaugural address by President Dewey, the set papers were:

"Some Notes on Obtaining an All-the-Year All Gas Kitchen," by Mr. J. R. Huntting—Commercial Supervisor—that is a much more fitting designatory term than that of Commercial Engineer—of Messrs. Childs, Hulswit & Co.

"A Brief Record of Progress in Fuel Briquette Manufacturing at Detroit," by Mr. W. S. Blauvelt.

"Studies in the Manufacture of Coal Gas," by Messrs. A. H. White and Fred. E. Parke—the latter is the holder of the Michigan Gas Association Fellowship, University of Michigan.

"Ways and Means to Increase Gas Sales," by Mr. E. J. L'Esperance, Saginaw City Gas Company.

"A New Method of Condensing and Scrubbing," by Mr. Wm. Seymour, Grand Rapids Gas Light Company.

Report of the Special Committee on "Rules and Suggestions for Doing Away with Accidents Around Gas Works," by Mr. Herman Russell, Chairman.

Report on the Michigan Gas Association Fellowship at the University of Michigan, by Mr. Herman Russell, Chairman.

These, with the regular routine business, should have kept the members thoroughly engaged during the technical sessions. The round of pleasure roster was a most attractive one, embracing, as it did, opportunities to visit the famous health resorts of Battle Creek, and its great industrial hives as well; for there are located two huge factories given over to the producing of cereals. The American Cereal Company operates in Battle Creek a large branch factory, in which great volumes of gas are used on industrial account. There also are the beautiful plants of the Postum Cereal Company, not to say anything of the steam pump works and the agricultural works, of which two are kept busily in action. The Elks' Fair was also in full swing. The best of all, however, was the "Dinner at the Country Club," the beautiful home of which was completely at the convenience and pleasure of the Association. This was set for the evening of Thursday, and the advance arrangements were such as to leave no doubt as to the enjoyableness of the gathering. Besides the speechmaking, it was ordained that the gustatory joys should be heightened and the mental menu better punctuated by strains of melody furnished by the Venetian Trio. Secretary Ewing certainly is a painstaking and efficient organizer.

THE MANCHESTER (ENGLAND) GAS EXHIBITION.—Mr. Walter Cawood, Secretary of the Manchester District Institution of Gas Engineers, and also of the Society of British Gas Industries, informs us that a gas exhibition is to be held at Manchester, England, from October 23d to November 9th next. The exhibits will comprise interior and street lighting plans and devices; cooking, heating and ventilation for public and domestic purposes; motive power for industrial uses; and the various applications of gas in textile and other factories. Residual products of gas and models of gas plants with testing apparatus, will be well represented. The leading firms in the British gas industry, and the local Institution of Gas Engineers are lending their practical support. The Great St. James Hall, Manchester, is the venue. The Chairman is Mr. T. Newbigging and Mr. Dugald Clerk is at the head of the Advisory Committee. The exhibition there last year was a pronounced success, and many other than English firms showed their wares. Intending American exhibitors may address Mr. Cawood, by mail at Manchester, or telegraph him there under the registered address "Exhibition, Manchester."

THE MUELLER CO.'S HALF CENTENNIAL.—THE great picnic commemorative of the 50th anniversary of the H. Mueller Manufacturing Company, of Decatur, Ills., held in that city the 7th inst., was a great event. Over 2,500 enjoyed it, and the programme, lengthy and varied as it was, was put through without a cut or a hitch. Governor Duncan, of Illinois, welcomed the throng, and paid due and complete homage to the genius of that sedate, courtly, good man, Hieronymous Mueller, who 50 years ago put in action the great concern now known to gas men the world over. Our account of the picnic must be put over for a week, owing to the lateness of the hour at which our account of it came to hand.

[Prepared for the JOURNAL.]

The Boiler of the Gas Plant.

By "ENGINEER."

The steam boiler of the gas manufacturing plant deserves more notice than it usually receives, and I came to that conclusion after I had called at a number of manufacturing plants in which they were having troubles with their boilers. I found that in several cases troubles were due to the installation of second-hand boilers. The recklessness of some people in the selection and installation of boilers is something astonishing. I have seen the best and most modern machinery installed in a first-class gas making plant, only to have the whole equipment handicapped by the buying and installing of a cheap or second-hand steam power plant. Often the amount of money expended on the gas making equipment so far exceeds the allowance that it becomes necessary for the manager to cut down on the steam plant, consequently we find poor steam plant outfits occasionally. Then again, instead of poor equipment we find cheap men. This is a most serious error to make An inexperienced or careless fireman or engineer will do considerable damage to your excellent steam plant in quick time. You may get him for 50 cents or $1 per day cheaper, but you will lose more than that on him in the end. In fact, you may suffer serious loss through the happening of an accident. Not long since a steam plant of a gas works consisted of the three boilers arranged as illustrated in Fig. 1. The man who had the job of firing up early every morning, was almost always a little late, and allowed just barely time enough to get things right before the starting up period was reached.

It was usually dark when he had to get up the steam, and he trusted to chance every morning, because he could not see all of the gauges without using the lantern at different points. Nor had he any time to inspect; he allowed just time enough to rush the fires and get up the steam. One morning he found things as usual, but after the steam was up hot ashes and vapors commenced coming out through the fire door and ash door of boiler No. 3. As the water and pressure gauges registered correctly the fireman could not account for it. In a little while the steam and hot ashes drove him from the fire room and only by hard work were the fires drawn from beneath the boilers. Then it was discovered that the shell over the fire of boiler No. 3 had blown out with a bulge, as at *A*, Fig. 2. An investigation proved that on the previous day someone had been trying the boilers, for test purposes no doubt, and failed to shut off the cocks of the water gauges, forgetting to open the same. The fireman in his early morning haste did not have time to see if the cocks were open. He could see the water in the gauges and took it for granted that the water was at the same level in the boiler; but the water in the gauges was held there by the stopcocks, the boiler itself being empty. Then the fireman was further deceived by the fact that enough steam escaped through leaky valves to create a pressure of steam on the steam pressure gauges on boiler No. 3. Hence with so many odds against him, it is not strange the fireman was confused. The blow-off was closed and the boiler was left empty by the testing party of the previous day and the fireman got the benefit of it. He lost his job and the owner of the plant was out about $200 on repair work. The break in the boiler plate was fixed by riveting a new plate completely over the fracture. A similar case occurred at another gas works in which a series of boilers was employed. One of the boilers was not properly connected with the water pipes, and there came a day when these water pipes clogged at a critical time. The fireman being of a sleepy character, was accustomed to fire up and then snooze at a certain period of the afternoon. The engineer would run things for him during that interval; but on this particular afternoon the engineer, having a main driving belt of the plant to fix, forgot all about the boiler room. The fireman had dropped off to sleep with a fierce fire raging in the furnaces. Before long, one of the boilers opened at the seams, as at *B*, Fig. 3, filling the boiler room with steam which scalded the fireman. It was afterwards shown that this one boiler of the set was a second-hand specimen that had been picked up from the bargain-counter boiler sales of the country, which class of junk boilers you can get at very low prices anytime you want them. This weak boiler had to be installed in the system with the more powerful ones, and as long as everything ran smoothly the boiler stood the test well. But as soon as the pressure exceeded the regular amount by a small proportion the seams of the weakened plates of the old boiler opened and an accident resulted.

Of course, the fireman was to blame for sleeping during duty hours. The engineer should have been there at his usual time if he had promised to do so. The owner of the plant should not have purchased the boiler from the junk man, and so on; but the deed was done, and such things have to be taken as they come.

I see that engineers and firemen are using old rails for grate bars in some of the smaller gas works. The section of the ashpit is shown in Fig. 4, with the alignment of the rails. The old rails as obtained from the buyers of discarded railroad property are cut the right length to fit over the ashpit of the boiler as shown. In nearly every case I noticed that the rails were exceedingly warped, as at *C*. Fig. 5 gives another view of the fire grate made of old pieces of steel or iron rails. It will be noticed that the rails are badly sprung out of line. This means wastage of fuel which will fall through before the ignition is complete. Also, that there will be considerable bother in getting the bars cleaned off every day.

And so we might go through the boiler rooms of gas manufacturing establishments and noting defects of all kinds, although as a rule I find everything in first-class order. I have observed that much new and expensive steam power machinery has been put in of late. Time and money are no objects to some of the enthusiastic men who are improving their gas plants. Nevertheless, there are always a few employees in every plant who like to tinker, who avoid hard work, who delight in introducing new schemes, who are lacking in attention, etc., who make trouble for the manager. One man rigged up a damper adjuster in the tall stack of the works and fixed it to be operated with wires and a lever, as in Fig. 6. The end inner bearing supporting the shaft of the disk damper was made too short. Therefore, after the bearing point had worn a little it dropped out, letting the damper disk hang down by its weight, as at *D*, Fig. 7. This put the damper out of action and clogged up the stack until a stack man came along one day, who, for a fee of $10, ascended the stack and got out the rigging.

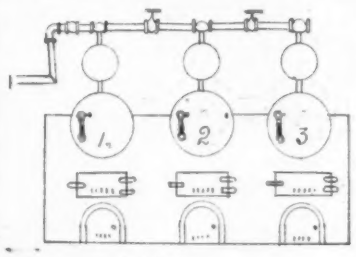


Fig 1

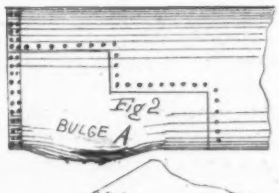


Fig 2

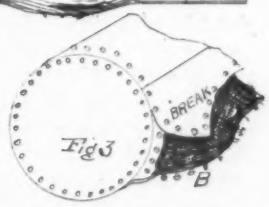


Fig 3

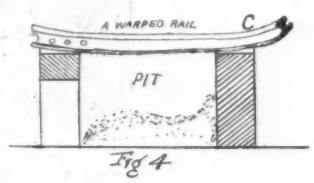


Fig 4

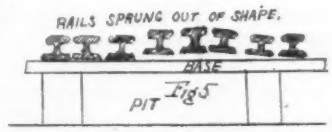


Fig 5

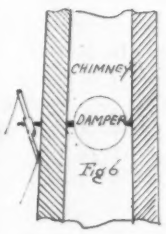


Fig 6

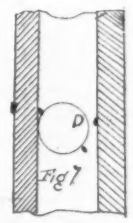


Fig 7

Pipe Welding by the Thermit Process.

We are indebted to the Goldschmidt Thermit Company for illustrations and description respecting the apparatus named in the heading. The first illustration shows the clamps in position, holding two ends

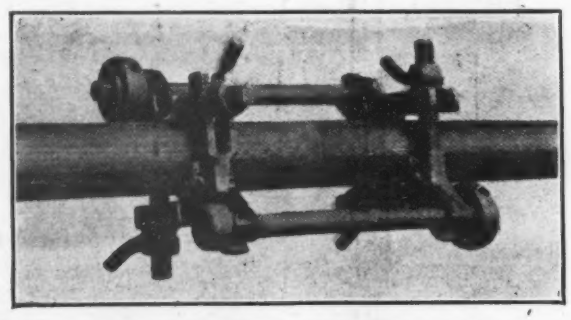


Fig. 1.—Clamp Holding Two Pipe Ends Together.

of pipe together ready for a butt weld. Pipes from 1 inch to 4 inches can be handled with the three sizes of these clamps. The second cut

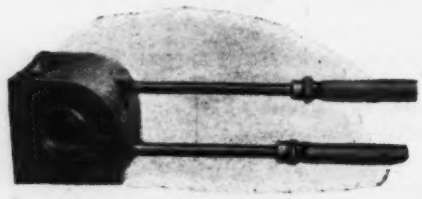


Fig. 2.—Mold for Pouring Pipe Joint.

shows the mold for surrounding the joint to be welded. The third cut

Fig. 3.—Pouring Horizontal Pipe Joint.

shows the process of pouring the melted metal from the crucible in which it is melted by the use of a welding portion of thermit, ignited with a half-teaspoonful of ignition powder. The clamps, mold, crucible and tongs shown in the cut, with thermit and ignition powder, are all the apparatus and materials required for making a weld.

Thermit is a mixture of finely divided aluminum and iron oxide, which, when ignited in one spot by means of the ignition powder, communicates the combustion throughout its mass without the use of heat or power from outside and produces during this combustion, in about 15 seconds, a temperature of approximately 5,400° F. During the reaction which produces this heat, the aluminum and the oxygen contained in the iron oxide combine to a highly superheated liquid slag, aluminum oxide. The iron which is set free at the same time and at the same temperature sinks to the bottom of the containing vessel or crucible. By pouring the superheated molten mass around the pieces to be welded they are brought to the necessary temperature for welding. The heated slag floats on top of the iron in the crucible and is first poured into the mold, where it adheres in a thin layer to the walls of the mold and the pieces to be welded and protects them from contact with the liquid iron which runs in last. The heat of the superheated materials run into the mold softens the ends of the pipes in contact with each other. The clamps are then drawn up and the weld is effected by the squeezing together of the now plastic ends of the parts to be welded. The layer of slag is easily chipped off after cooling and removal of the clamps and mold, and the weld is left solid and shows only a barely perceptible upset at the joint, which can be machined off if desired. It is claimed that the weld is as strong as the pipes themselves. The fourth cut shows a weld in a vertical pipe ready to pour, and the difference in form of mold required.

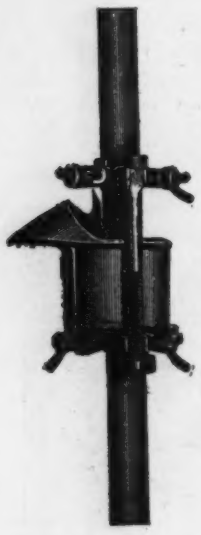


Fig. 4.—Joint in Vertical Pipe Ready to Pour.

The Engineering of Show Window Illumination.

By Mr. J. R. Cravath and Mr. V. R. Lansingh, in *Elec. World.*

The central station contract agent or solicitor should be in a position to give customers sound advice on the lighting of their show windows, as this is now a most desirable class of business. It is the purpose of this article to take up only show windows which are to be lighted for the purpose of displaying the goods in them to the best advantage. Decorative lighting has its place in certain kinds of show windows, especially those in which the display of the goods is of secondary importance. Light is of itself attractive both to moths and men, and a window in which there are a lot of exposed lamps may attract attention and invite people to pass along the street where it is located rather than along a darker street. It does not, however, show up the goods to the best advantage, and that is the main object of a strictly "show" window. The merchant is not advertising the electric light company; he is trying to show his goods in such a striking and pleasing manner by night as to be able to sell them. In such windows the display of goods is the first consideration. A display of light, if brought into too great prominence, may even go so far as to detract from the display of the goods and give them a place of secondary importance, either by blinding the observer so that he cannot see the goods, or by making the decorative lighting features so prominent that the goods are forgotten.

It is now too generally established to permit of controversy that for the best illumination of goods in a show window, most of the sources of light must be concealed. Whatever light is exposed should be for secondary decorative purposes. When dealing with the illumination of goods from concealed lamps, we have a purely engineering problem rather than one of decorative or artistic effect.

The position of the lamps in the window is the first thing to consider. The common form of show window necessitates placing the lamps at the front and top of the window. This accomplishes the double object of making it easy to conceal the lamps from the casual observer and of throwing light on those portions of the goods which are seen from the street. The plan of studding a lot of lamps over the ceiling of the show window is not to be recommended except for decorative purposes, as the lamps in the back of the window cast so much of their light behind the goods in the front part of the window instead of illuminating the portions of the goods facing the street. It is, however, important to have all sides of the goods which can be seen from the street well illuminated; that is, there should be no dark shadows at the sides of the goods. If the window is wide, that is, has a wide pane, and there is a row of lamps at the top next to the glass, this matter of lighting the sides of the goods takes care of itself. If the window has a very narrow pane and is very deep, that is, if it extends far back from the street, it may be necessary to provide for more lamps than those along the front window pane. Lighting from above has sometimes been supplemented by concealed lighting from below. At present writing, such lighting from below has hardly passed the experimental stage, and therefore cannot be taken up here. If lighting from below is used at all, the lamps must be well concealed from passers, and the great preponderance of light must still be from above in order to prevent unnatural shadows.

Taking, therefore, the top of the window next to the glass as the proper location for the lamps, the next step is the selection of the proper lamps and reflectors to produce the best results in the different sizes of windows. Right here it may be said that while the average run of window lighting of to-day is very much in advance of that of 10 years ago from an illuminating engineering standpoint, there is room for an equally great improvement in the next 10 years. To-day we see concealed lamps in most show windows instead of the exposed lamps of 10 years ago, and we see the lamps equipped with reflectors where reflectors were not used formerly; but the selection of the reflectors in most cases has been made without any regard to the shape of the window to be lighted. As a result, we see high, narrow windows which call for reflectors which concentrate the light over a small area, equipped with reflectors with a wide distribution adapted to low, deep windows, thus sending much light where it is not needed entirely outside the window area. On the other hand, we see low, deep windows in which very concentrating reflectors are used.

In many windows the reflectors are so pointed as to deliver a large percentage of their light on the sidewalk rather than in the show window. There are some who maintain that ample illumination of the sidewalk in front of the store is a part of the game of attracting people to the place at night. With the numerous electric signs and

ample street lighting on most down-town streets, however, such lighting of the sidewalk is not necessary, and in fact detracts from showing up goods to the best advantage. If a show window is thoroughly lighted there will be enough reflected light from the back of the window and the goods for all practical purposes of sidewalk illumination. Taken altogether, the business streets of our cities are full of absurdities in show window lighting.

The question of the proper selection and installation of lamps and reflectors for show window lighting depends mainly on the shape of the window to be lighted. As show windows are made in such a great variety of relative dimensions, it is difficult in an article of this kind to even approximate the numerous problems that come up in practice. The problem will be solved for a number of the more common proportions of show windows and the same methods can be followed with other dimensions than those given.

The two principal things to be accomplished by the reflector that we use for a given window are first, the confinement of most of the light flux or rays to the space within the window, so that there will be as little as possible going in useless directions; and second, the even or uniform illumination of the goods so that there will not be too much of a contrast between the lighting of different parts of the window.

In selecting reflectors, we must, of course, have before us information on the light distribution of the reflectors that are likely to be useful. Photometric tests showing the light distribution given by various common reflectors are now easily available. With such information before us to work with the first thing is to find out what shape of photometric curve, or in other words, what kind of light distribution is the ideal one for the window under consideration.

We will take up first a very high, shallow window, such as shown in cross section in Fig. 1. In this the lamps are 13 feet above the bottom of the window, the window is 3 feet deep and has a back 8 feet high. In case the window has no back, as frequently is the case in small stores, the method of treatment will be similar. The first step in the problem is to draw a cross section of the window to scale, as in Fig. 1. We wish now to learn the most desirable distribution of light from the lamps in order to illuminate equally the show window in all parts where goods are displayed. As the contents of show windows change from week to week, one cannot always predict exactly what distribution of light is desirable. One way is to figure on securing an equal illumination at the points most remote from the lamps, namely, along the floor and back of the window. If the goods stand some height in the window, they will, of course, receive greater illumination than the bottom and back, so that usually a point less distant than the bottom and back of the window must be figured on. There is undoubtedly also some room for argument as to whether we should figure on normal illumination (that is, the illumination on goods placed at right angles to the rays from the lamps) or whether we should figure on horizontal or vertical illumination received on horizontal and vertical surfaces in the show window. Normal illumination has the advantage of being simpler to calculate and is probably nearest a correct basis, everything considered.

To determine what kind of light distribution will best illuminate our window, or, in other words, to find out the form of the photometric curve which we should seek, a perpendicular line from the lamps to the bottom of the window should be drawn. Then, with the lamps as a center, draw radial lines every 10° to the bottom and back of the window, as in Fig. 1. It is now evident that we want a reflector that gives most of its light within an angle of 30°. We must next learn what distribution is best within that limit. We will now assume that the position of the goods in this window will usually be about that of the dotted reference line *AB*, which is drawn from the top of the back to the middle of the bottom of the window. If the goods are all to be in the bottom of the window, our reference line *AB* should be the bottom of the window. Measure the distance on each radial 10° line from the lamps to the reference line *AB*. Extract the square root of the number (best done with a slide rule) and then measure and mark with a cross on the radial line a point corresponding to the square root so obtained. Repeat this operation for each radial line. Draw a curve through the points thus obtained and this curve is the ideal distribution curve for that window. We now have to select from the reflectors commercially available the ones coming nearest to these conditions. None conform to them exactly. The authors have selected from the reflector tests they have at hand the reflectors which seem to be best suited to the various windows considered. Some of these tests have already appeared in the book entitled, "Practical Illumination" by the authors, but they are reproduced here for convenience in studying the problems brought up by this article.

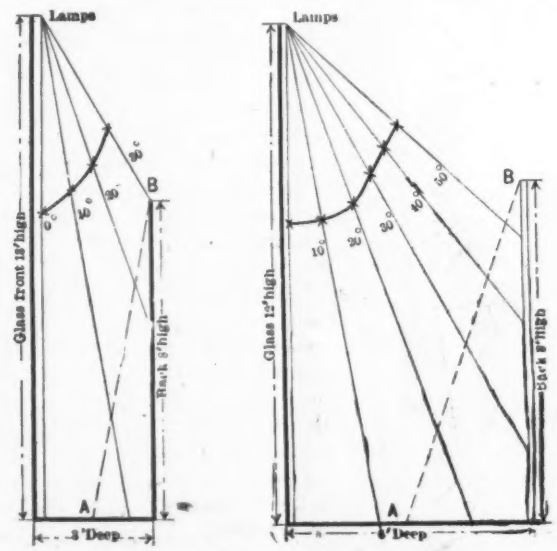
To meet the conditions in such a window as shown in Fig. 1, the authors have selected several reflectors, the light distribution of which is shown in Figs. 6 to 11. Fig. 6 is that of a holophane concentrating prismatic reflector, with a 32-candle power lamp. This reflector delivers a large percentage of its light within an angle of 30° or 15° each way from the vertical. If used in such a window as Fig. 1, the lamp axis should be tipped so as to come between 10° and 20° lines in Fig. 1, preferably a little to the right of the 10° line.

In Fig. 7 is shown the light distribution of a concentrating D'Olier aluminum reflector, with a 16-candle power lamp. The lower part of this reflector is conical in form, curving off to a parabola near the neck. This reflector, if used in such a window as Fig. 1, should be pointed between the 10° and 20° lines. Fig. 8 shows the light distribution about an "X-Ray" deep conical mirror reflector with a 16-candle lamp. This should also be pointed slightly in toward the back of the window. Fig. 9 shows the light distribution about a common form of conical reflector consisting of sections of mirror mounted in a metal cone case.

The reflector has an opening of about 90° and is 10 inches in diameter. Fig. 9 shows the distribution with a 16-candle power lamp and Fig. 10 with a 32-candle power lamp. It is seen that it is extremely concentrating with both the lamps, giving most of its light within the confines of such a window as Fig. 1. Another reflector suited to this kind of window is one recently brought out under the name of the "X-Ray Helmet." This is designed for 125-watt Gem lamps or 105-watt tungsten lamps. It is not symmetrical, but has a flat side which is intended to be placed toward the window pane to catch and reflect light which would otherwise be wasted outside the window. The distribution of light from it is therefore not symmetrical. Fig. 10 shows the distribution of light in a plane at right angles to the flat side of the reflector. If hung as in Fig. 10, the window pane would be at the right and the goods at the left. Fig. 11 shows the distribution of light from this reflector in a plane parallel with the flat side of the reflector; that is, the distribution as it would be sideways in the window.

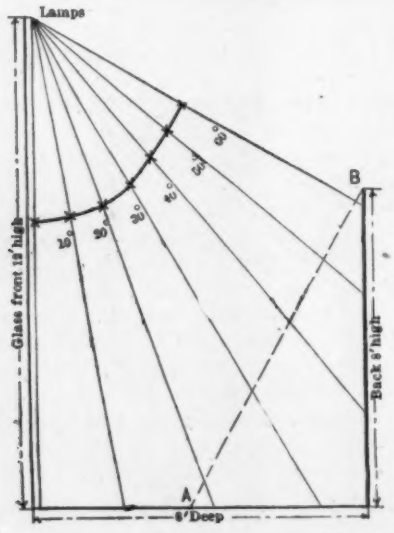
As to the number of lamps and reflectors that must be installed to satisfactorily light a window, or in other words, the distance apart of the lamps, local conditions must always be considered. In cities where very high window illumination is necessary in order that the show windows may not seem dark by contrast with those of other merchants, the lamps should be placed close together; while in country towns and on suburban streets, fewer lamps will answer the purpose. The position of the lamps, the angle at which they are placed and the reflector should, however, be the same for all windows of the same dimensions, the only variation being in the number per yard of window front.

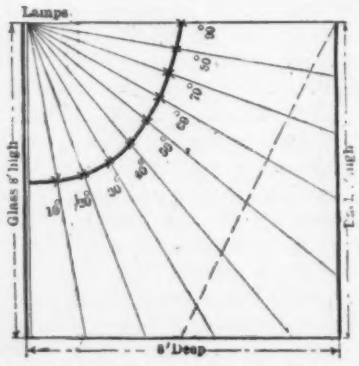
We will next take up the window indicated in Fig. 2, where the

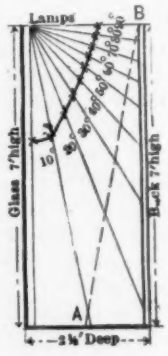


Figs. 1 and 2.—Show Window Illumination.

lamps are placed 12 feet above the floor; the window is 6 feet deep and the back 8 feet high. Here we evidently need a reflector which will cover 50° and give a curve like that plotted in Fig. 2. For such a window the reflector mentioned in Fig. 11 would evidently give good results, as would also that in Fig. 8 if it were inclined at an







Figs. 3, 4 and 5.—Distribution of Light in Show Windows.

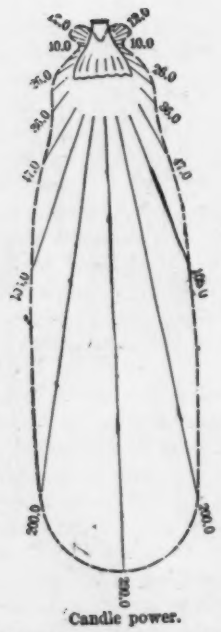


Fig. 6.—Light about a Concentrating Prismatic Reflector.

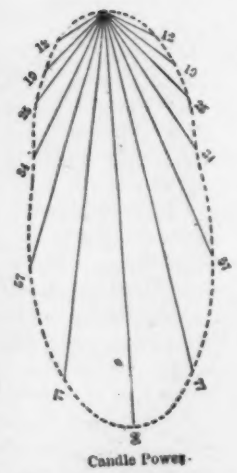


Fig. 7.—Distribution of Light about a Cone-Parabolic Reflector.

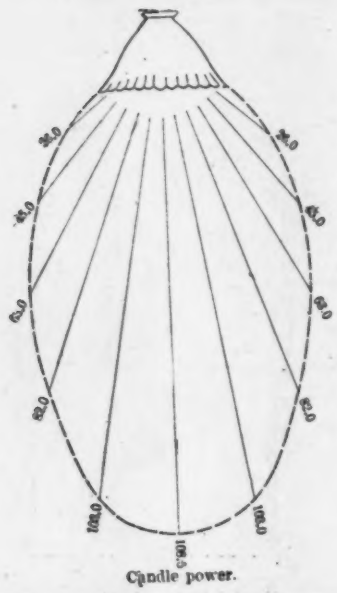


Fig. 8.—Light about a Conical Mirror Reflector.

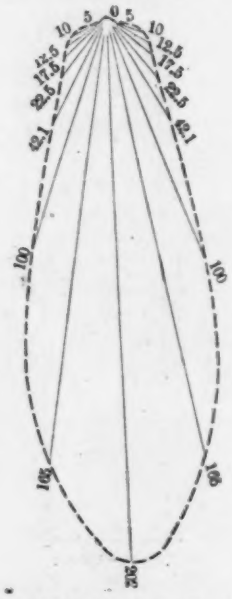


Fig. 9.—Light about a Conical Plate Mirror Reflector.

angle of about 25° from the vertical. The regular concentrating prismatic reflector used on 125-watt Gem lamps, the distribution of which is shown in Fig. 12, would also be fairly good for this purpose, although evidently allowing much more light to escape above in the window and into the street than would be consistent with the maximum economy.

In Fig. 3 we have a window with lamps placed 12 feet high, with a window 8 feet deep and 8 feet high at the back. Here an angle of 60° must be covered. For such a window the distribution of light shown by Fig. 16, which is that of an "X-Ray" reflector with a 32-candle power lamp, is excellent. The reflector used in Fig. 12, as well as that used in Fig. 11, could also be used in this window if properly pointed at an angle to cover enough area. If the reflector shown in Fig. 11 were used at an angle, it would be advisable to place a supporting strip along the top of the window against which the flat side of the reflector could rest, so as to take the strain of the very heavy reflector from the shade holders and lamp sockets. In fact, such a supporting strip is advisable with all concealed window reflectors when placed at an angle, although it is more necessary with the extremely heavy reflectors. Such a support can easily be installed by putting a piece of wood or pipe across the window at the proper place.

In Fig. 4 is shown the proportion of an extremely deep, low window where the lamps are only 8 feet above the window floor and the window is 8 feet deep and 8 feet high at the back. In such a window it is usually desirable to light it well clear to the top of the back, as well as in the extreme front, which means that the reflector must cover an angle of 90°. Usually, with such low windows, there is not much room for the lamps; hence it is sometimes impracticable to put a lot of conical reflectors along the top of the window because of their size.

Were it not for this, the reflector which gave the light distribution shown in Fig. 16 would be good for this window.

A reflector specially adapted to this work is the "Poke Bonnet," the light distribution of which is shown in Fig. 14. This reflector gives nearly the same amount of light high in the window as straight down, which, in the case of a window of this kind, is exactly the thing desirable. Another reflector which could be used in such a window is the common parabolic aluminum half reflector which gives a distribution of light like that shown in Fig. 14, with a 16-candle power lamp.

A peculiar form of window which is found frequently in stores which are slightly below street level is that shown in section in Fig. 5. The window is only 2½ feet deep and 7 feet high both at front and back. There is usually but little available space for the lamps because they come such a short distance above the heads of passers. In such windows goods are frequently placed in the extreme top. In fact, the best part of the display is usually in the top because the window is very small and goods in the bottom do not receive as close inspection from passers as those in the top. For such windows the common form of window trough with sectional plate mirrors is well adapted in its light distribution. The distribution of light from such a trough with two 16-candle power lamps is shown in Fig. 15. The light distribution shown in Fig. 14 could also be used in such a window and would produce higher illumination of the top of the window than the common window trough, though there would be more contrast between the top and bottom of the window if a reflector like that shown in Fig. 14 were used.

The reflectors have so far been considered mainly on their reflecting qualities when new, without regard to their probable depreciation or their relative first cost. The first cost is such a small item on any reflector that is used every night in a show window that it need hardly be considered. The probable depreciation is a serious question, however, because it may result in a great loss of light. As to depreciation,

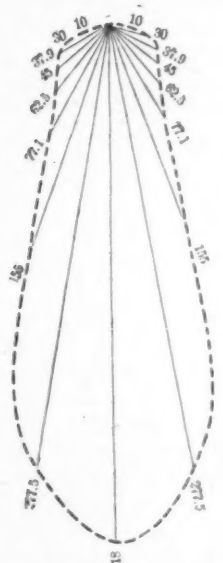


Fig. 10.—Light about a Conical Mirror Reflector.

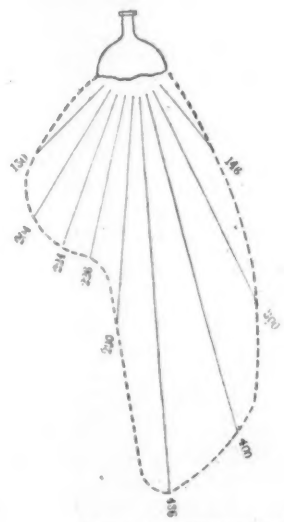


Fig. 11.—Distribution of Light in two Planes about an X-Ray Helmet Reflector.

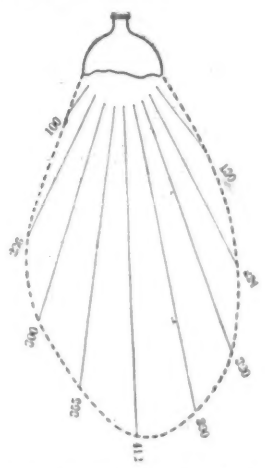
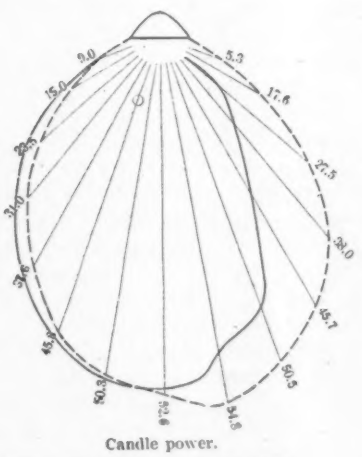
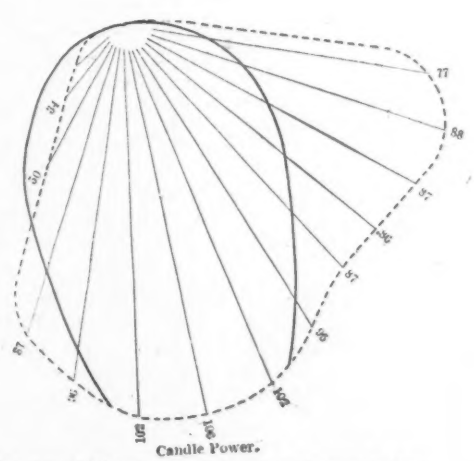


Fig. 12.—Light about Gem Lamp and Concentrating Reflector.



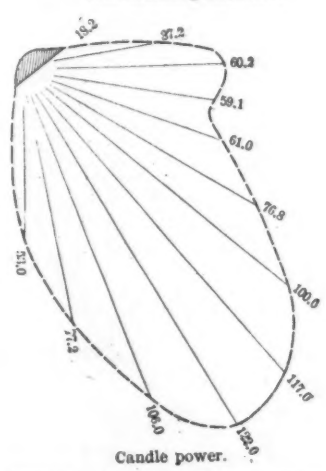
Candle power.

Fig. 13.—Light about a Parabolic Aluminum Reflector.



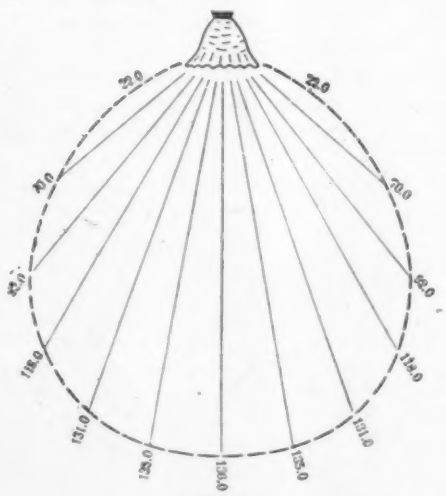
Candle Power.

Fig. 14.—Light about an X-Ray Poke-Bonnet in two Planes.



Candle power.

Fig. 15.—Light about Common Window Trough.



Candle power.

Fig. 16.—Light about X-Ray Conical Reflector.

the common plate mirror type is the worst offender. It starts in with an efficiency which is very high, but under the heat that is developed by the large number of lamps in the top of the show window, it may easily be depreciated in a few years so as to be passed by some of its less pretentious rivals. Some specially patented processes of silvering give better results in durability than common plate mirrors. Prismatic reflectors, of course, consisting as they do of nothing but glass, need simply be taken down and washed to make them as good as new. All reflectors suffer equally from dust on the inside and on the lamps. None of those considered in this article is affected by dust on the outside. All of those considered are subject to more or less breakage, except the aluminum. While the plate mirrors held in tin cases never completely fall apart, the breaking and dropping out of sections could be considered the equivalent of breakage on the other glass types.

Another thing to be considered is the question of concealing the lamps entirely from view as seen from the street. As a rule there is not sufficient space between the top of the glass and the ceiling to place any form of conical reflector without making it visible. In order to overcome this objection it is customary either to use a shade which, when the lamps are lighted, is lowered to conceal them, or to paint a black, red or other colored strip across the top of the window. The strip can also be used to good advantage for advertising purposes to display the company's name or goods sold by making the letters transparent, or, in other words, leave the letters clear, painting in the balance of the strip. This, of course, requires the window to be lighted by reflectors which will allow some light to fall on the strip. In this case prismatic reflectors, such as that shown in Fig. 6, are best adapted, although such a reflector as that shown in Fig. 13, if placed near the top of the band, will often admirably answer the purpose. In the case of trough reflectors of either the standard or "poke bonnet" type, it is often unnecessary to paint such a strip in the window on account of their relative shallowness, as the lamps are generally placed horizontally. Whether a window should be lighted so as to take advantage of the illuminating sign at the top of the window or not must be left to each individual case.

Hot Coke Conveying Plant at the Paris Gas Works.—Experiments with a Water Jet Conveyor.[1]

It may, with some degree of truth, be said that the problem of quenching and conveying hot coke, though it has occupied many engineering minds for a long time, has never yet been so fully and so satisfactorily solved as is to be hoped for. As is well known, and as our past "Register of Patents" testifies, the attention of inventors—or of those who file patent specifications (for the terms are not synonymous)—seems to be given at particular times to particular matters. The vogue of hot coke conveyors may perhaps be put down as between the years 1890 and 1903. After the latter year, attention

1. *Journal of Gas Lighting.*

was direction more to improvements in stoking machinery and to the possibilities of vertical retorts. Had it not been, perhaps, for these later distractions, further mechanical skill might have been devoted to the difficulties of carrying hot coke, and the problem more perfectly solved than has been the case.

It may also be reasonably considered that the newer and more "pushing" forms of retort discharging machines have given rise, to some extent, to different requirements and arrangements for dealing with the expelled hot coke, discharged as it is in one long, live stream from the retort. The newer stoking machines necessitate newer conveying appliances. As the former were early and extensively experimented with by the late Paris Gas Company—more especially at their La Villette works - it is natural that the latter should also receive every trial at the hands of the engineers in the Paris Gas Works. The columns of the *Journal* have, from time to time, contained references to hot coke plants which have been put up in Paris, and elsewhere in France; and our attention has just been drawn to the latest experimental hot coke conveyor which is being tried at La Villette works, and which may be called a "water jet" conveyor; for the coke is quenched and carried along a trough by a swift flowing stream of water.

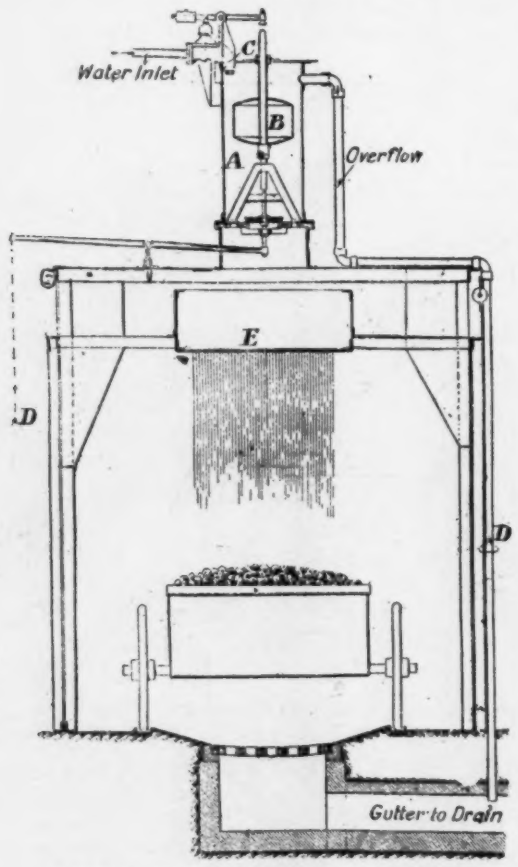


Fig. 1.—The St Claire-Deville Coke Quencher.

We will describe it later in the words of M. Thibeault, an engineer of Arts and Manufactures, who has contributed an interesting article to "Le Génie Civil" of the 3d inst., on the subject of "Coke Quenching and Conveying in Gas Works." His paper is well illustrated, and we reproduce some of the newer diagrams given, as well as summarize certain of his statements.

Difficulties of Quenching Hot Coke. - Preliminary reference is made to the arduous work of drawing, dragging, tipping, and extinguishing incandescent coke from coal gas retorts. The mere throwing of water over the coke is hard enough, as it is calculated that 65 liters of water are required for every 100 kilos of coke. This is roughly the equivalent of about 7 gallons per hundredweight. Further, the wheeling out of the coke to the yard represents about 15 per cent. of the retort house labor; the carrying of water is approximately 7 per cent.; and the shoveling of the coke into heaps accounts for 12.5 per cent. The labor can be facilitated, as has been done at the Saint Mandé and Vaugirard works of the Paris Gas Company. The coke drops through hinged doors in the retort house flooring directly on to a quenching pavement below. After being sprayed with water from a hose pipe, the coke is loaded into carts standing at the lower side of the quenching platform. Apparently there are no mechanical appliances at these works; and in such places a shower coke quencher is often useful. Fig. 1 shows an apparatus designed by M. Sainte-Claire Deville, and adopted throughout the Paris Gas Company's works. Its advantage is that it regulates the amount of water used according to the weight of coke to be quenched; and, further, it effects some considerable economy in the water consumed. After being placed in a dry yard, the coke thus quenched does not contain more than 2½ per cent. of water. The apparatus consists of a measuring tank *A*, in which a float *B* regulates the inlet water cock *C*. The bottom of the measuring tank is closed by an indiarubber valve. It is worked by levers and a chain *D*. During the emptying, the valve shaft keeps the float raised, and thus the cock *C* is closed. When the valve is worked, the water from the measuring tank runs rapidly into the box *E*, the bottom of which is perforated. The shower of water thus produced quenches the coke; any excess running into the gutter. M. Sar's apparatus, designed on similar lines, is also described and illustrated.

Paris Experiments with Hot Coke Conveyors.—Mechanical coke conveyors are then mentioned, the De Brouwer being given first place. Messrs. Graham, Morton and Co.'s solution of the hot coke problem, as carried out at the Nanterre Gas Works, is incidentally referred to. At Mulhouse, the coke coming from inclined retorts falls into aerial

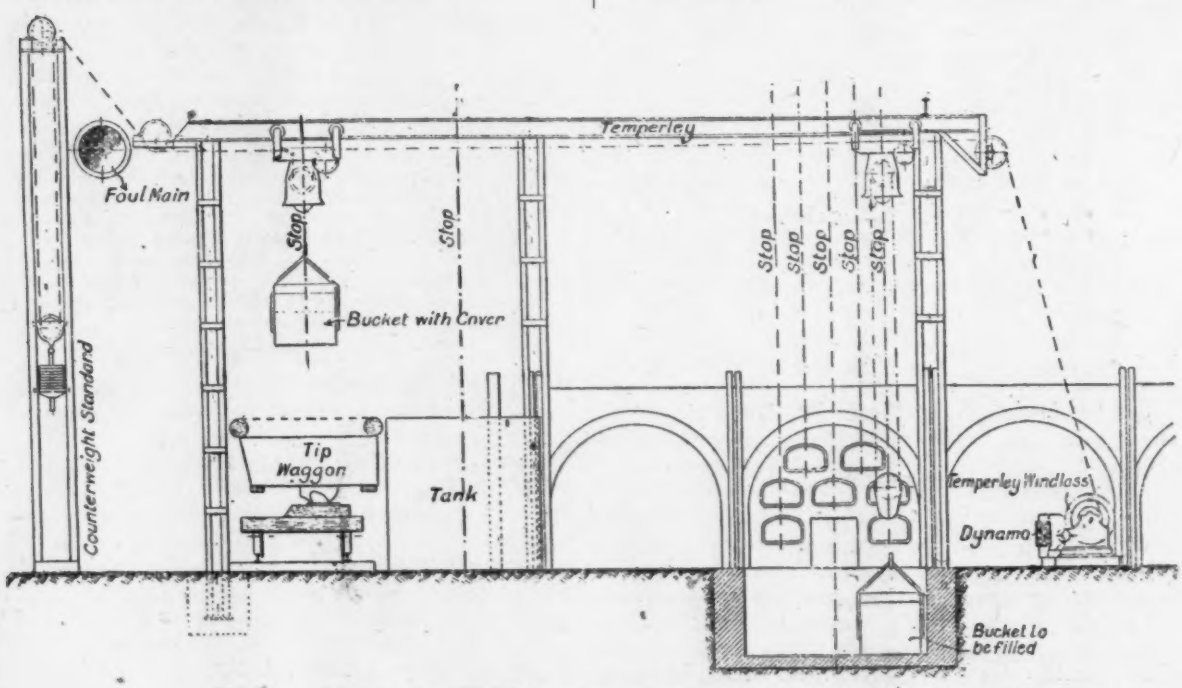


Fig. 2.—The Temperley Transporter Adapted to Carrying Hot Coke.

buckets suspended from rails. They carry the incandescent coke, and deposit it in the yard. It is cooled principally by being spread out; quenching by water being supplementary. Such a system requires plenty of space, besides which the re-handling of the coke for breaking or loading is costly. The output of all these appliances is limited, and their upkeep is heavy. Especially is this the case, when, as with the Paris Gas Company, the coke from a 6-meter (20 feet) retort has to be dealt with in 16 seconds—*i. e.*, the time taken to discharge the retort with a pushing machine. What this means is shown by the following figures:

	Carbonization in— 4 Hours.	6 Hours.	8 Hours.
Weight of coke....	210 kilos (463 lbs.)	315 kilos (694 lbs.)	425 kilos (937 lbs.)
Volume of coke	5.55 hectoliters.	8.32 hectoliters.	11.11 hectoliters.
Calories....	73,500	110,250	147,000

Numerous trials have been made by the Paris Gas Company with hot coke conveyors, all directed to the end of reducing the arduous labor involved, and of obtaining large pieces of coke with the least possible dust, and with a quantity of water lower than 5 per cent.—the coke being at the same time perfectly quenched. One of the first attempts was with an adaptation of the Temperley transporter (see Fig. 2). It carried the hot coke from the retort house to a quenching tank. The ordinary open bucket of this apparatus was replaced by one with spaced bars and with a cover. But the sudden immersion broke the coke; and there were difficulties with the water. Moreover, the passing overhead, on an aerial way, of a bucket filled with hot coke was not desirable from the point of view of safety.

Another method tried was that of flat trucks moving parallel to the retorts being discharged. Outside the house, the coke was quenched in a water tower, as the coke was being taken to an elevator which filled the wagons for the coke breaking plant. The working of the trucks was complicated, more particularly in moving them in unison with the discharging of the retorts.

A movable quenching elevator of large capacity was also experimented with. It received the coke direct from the retorts, and delivered it into the railway trucks, which took it to the coke assorting plant. The coke was quenched while still in the elevator.

Lastly, at the Vaugirard Gas Works, a quenching box or hopper was arranged in front of a bench of retorts, as shown in Fig. 3. The

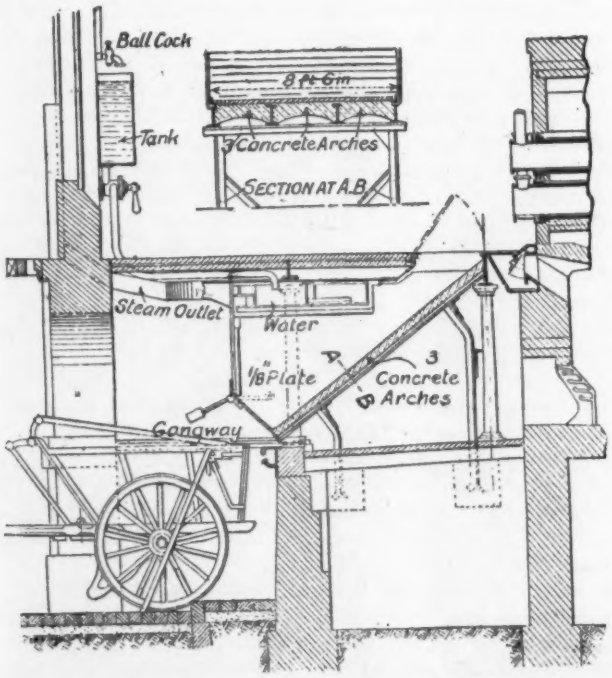


Fig. 3.—The Coke Quenching Closed Hopper at Vaugirard Gas Works.

coke fell by gravity into this box, in which (it being shut) the coke was sprayed, and left for some moments in the steam-laden atmosphere. In vaporizing the excess of water, the coke was cooled. The quenching box, indeed, was in substitution of spreading out the coke in the yard. By this arrangement, 210 kilos. (say 4 cwt.) of coke are quenched with 76 liters (16¾ gallons) of water with a stay of 3 minutes in the quenching box. Remaining there for 8 minutes, 60 liters, or about 13 gallons, of water are enough. The same amount of coke, if

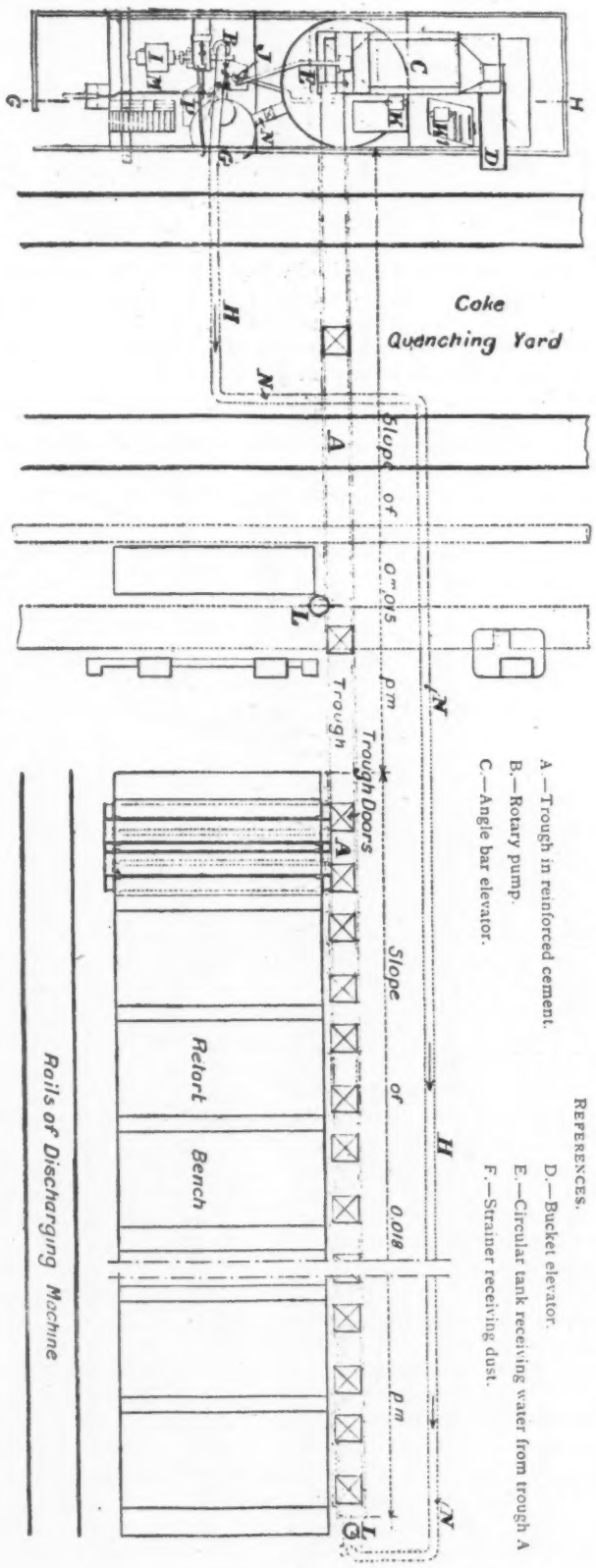


Fig. 4.—Plan of a Water Jet Hot Coke Conveyor at La Villette Gas Works, Paris.

REFERENCES.

A.—Trough in reinforced cement.
B.—Rotary pump.
C.—Angle bar elevator.
D.—Bucket elevator.
E.—Circular tank receiving water from trough A
F.—Strainer receiving dust.
G.—Second circular tank receiving water from F.
H.—Pipe returning water to trough A.
I.—Electric motor.
I.—Pump taking out dust.
K K'—Motors driving elevators C and D
L.—Sheet-iron chimneys taking away steam.
M.—Supply pipe to tank G.
N.—Water suction and delivery pipe to trough A.
O.—Dust suction and delivery pipe
P.—Suction and delivery pipe of infiltration water.

quenched in the open air, would require about 120 liters (nearly 26½ gallons) of water. The coke obtained is very dry, big, and of good appearance; but the arrangement necessitates a retort house of several floors, so as to place the hoppers underneath. The system is high in first cost and in upkeep.

These different trials showed the possibility of improving the methods of conveying hot coke, its quenching and loading into wagons, but not one of them solved the question practically and economically.

Quenching and Conveying by a Stream of Water.—Taking up an idea put out 30 years ago by M. Arson, it was thought that a strong stream of water might be utilized for conveying the coke to outside the retort house, and also quenching it. An installation of this kind has just been finished, and is now in operation at La Villette works on a bench of eight beds, each of seven "through" retorts. Figs. 4 and 5, with the explanatory list of references accompanying them,

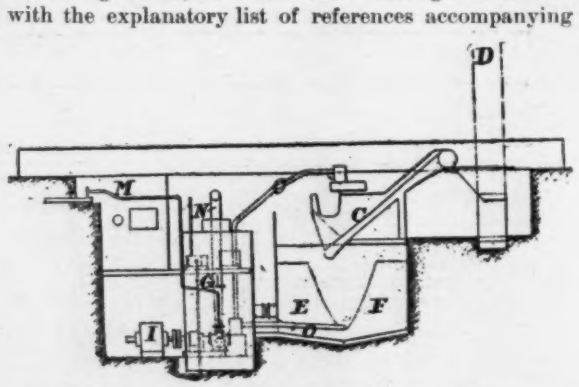


Fig. 5.—Section Through the Line *G, H* (Fig. 4).

will enable the general lines of the installation to be followed. There is a reinforced cement trough, *A*, 46 meters (151 feet) long, placed on the opposite side of the bench to the stoking machinery. This trough has a slope of 8 mm. per 1,000 mm. along the front of the bench, and 15 mm. for the remainder. Inside the retort house, the top of the trough is covered with sheet iron; doors being arranged in it on the center lines of the retorts. The coke falling through these doors from the retorts is rapidly carried by the stream of water along the trough, and deposited in the hopper of a large elevator with angle bars *C*, on which it is completely quenched by a spray. Then the buckets of the elevator *D* take the coke and fill wagons which go to the breaking and sorting plant. The elevators *C D* are driven by special motors *K*, *K*[1]. The water, after having been used for conveying the coke, falls into a round tank, *E*, of about 27 cubic meters (953 cubic feet) capacity. In it is a conical strainer, *F*, which collects all the dust formed. This is emptied by a special pump *J*. The water thus strained goes into a second reservoir *G*, 12 cubic meters (424 cubic feet) in capacity, from which it is returned by a rotary pump, *B*, through the piping, *H*, into the trough *A*. The same water, which is continuously in motion, thus serves for quenching and conveying the coke from all the retorts of the bench. Quenching vaporizes a certain amount of water; and this is made up by adding water to the tank *G* from the works' water main *M*. Two chimneys *L* are placed, one at each end of the trough, for carrying off the steam produced by quenching.

The quantity of water sent into the trough varies according to the speed of the pump *B*. This can deliver 450 cubic meters per hour. It is directly driven by an electric motor, *I*, of 25-horse power at 120 volts. The forcing height between the water level in the tanks and the highest point of the main is 2.22 meters (7 feet 3½ inches). The speed of the water in the trough at the moment of discharging the retorts is about 2 meters (say, 6 feet 6 inches) a second. The travelling speed of a De Brouwer conveyor does not exceed 200 to 300 mm. (8 to 12 inches).

When the coke falls into the trough, it is kept on the surface of the water by the phenomenon of calefaction. Being almost carried by the stream, it reaches the elevator *C*, but incompletely quenched. By the spraying which takes place on the elevator, it is possible to regulate the amount of water contained by the coke. It is to be observed that the mechanical arrangements adopted in this trial at La Villette are not definite; in fact, various appliances which were already on the works were utilized as well as possible. In any case, the system does away with large coke drying yards; and as none of the apparatus comes into contact with incandescent coke, the cost of upkeep should not be very great. Such a system is capable of numerous applications. Among them is that of vertical retorts, with which the taking away of hot coke, arriving in bulk by successive strokes, is one of the most difficult inconveniences to be overcome.

In conclusion, it is said that the water jet hot coke conveyor solves in a very happy way the problem of manipulating large masses of hot coke, quenching it, and then conveying it to other parts of a coke plant; and that the results obtained reflect very great credit on the engineers and their assistants who have contributed to it.

Failures of Power Generating Plant.[1]

In some introductory remarks prefaced to his recent report to the British Engine, Boiler and Electrical Insurance Company on the engine, motor and boiler accidents in 1906, Mr. Michael Longridge expresses some doubt as to the expediency of his continuing his annual criticism of engine details shown by experience to be of faulty design. It is no doubt quite true that, in some instances, the same kind of failure, originating from the same bad design, makes its reappearance in the report with unfailing regularity, and it is easy to understand that Mr. Longridge may feel it impossible to make any fresh criticism on these hardy annuals, and much disinclined to reiterate, yet once more, identically the same remarks about identically the same defects. The cessation of his most illuminating annual analysis of the true source of many most disastrous engine failures would, however, leave a void not easy to be filled. A cynical philosoper has observed that "a fresh crop of fools is born every year," and though the aphorism is a little too sweeping in its implications, it remains the fact that a new generation of designers is in need of education every 12 months. Some men trained in a good school may be inclined to feel that some of Mr. Longridge's recommendations are trite, and to hold that "no one ever makes parts in the faulty fashion set forth," but, nevertheless, every year supplies its object lesson of the fact that details proved by experience to be dangerous are constantly being repeated, and hence the ever recurrent necessity of emphasizing their faults.

As last year, failures of steam engines have been very numerous, about 1 in 8 of the steam engines insured having a breakdown of some kind or another, whilst with gas and oil engines the proportions were 1 in 12.4. The better showing of the internal combustion engine appears to be mainly attributable to its incapacity for taking an overload, whilst the greater flexibility of its older rival has led to its being seriously over-strained during the trade boom of the past 12 months. With a steam engine there is a strong temptation to increase the initial pressure when putting in new boilers, and as a consequence large, flat areas are exposed to a load for which they were never designed, and the connecting rods and main shafting have to carry considerably higher stresses than originally contemplated. With a gas engine the maximum pressure inside the cylinder is generally absolutely fixed by the quality of gas available and the size of the clearance spaces. Serious overloading is therefore only possible when a lighting gas is used in an engine designed to run with producer gas only. Fortunately, such a change over involves usually some structural alteration to the engine, as builders of large engines are very averse to fitting them up, in the first place, so as to be capable of running on both types of fuel. The gas engine thus escapes a source of disaster to which is to be attributed a large proportion of the failures of both its steam and electrical competitors. In this respect though, it must be admitted that enormous improvement is now visible in the treatment of electric motors, but two of the accidents to these, recorded in Mr. Longridge's report, being attributed to this source. Attendants seem at last to be learning that the repeated blowing of a fuse is not an indication that it should be permanently replaced by a stout piece of copper wire. As a consequence, a smaller proportion of armatures are being burnt out than was formerly the case.

Returning to the steam engine casualties, we reproduce (Table I.) Mr. Longridge's usual classification of the proportions in which various portions of the engines insured gave way during the past year.

It will be seen that valves and valve gears maintain their old preeminence as a source of trouble, being closely followed by spur gearing. The failures of cylinders, valve chests and covers, frequently occasioned by the admission of high pressure steam to large flat surfaces, originally intended for more moderate pressures, is less than in the previous year, though above the average of the whole period covered by these reports. The practice of fitting vertical air pumps with packing rings in place of mere water grooving has, of course, made its annual contribution to the list of accidents. As illustrating how entirely needless such rings are, Mr. Longridge quotes a case in

1. *Engineering.*

which the company's inspectors recently discovered an air pump bucket with no rings, and which was ¾ inch less in diameter than the barrel. In spite of this enormous clearance the pump was maintaining a vacuum of 20 inches to 24 inches, according to the load on the engine.

TABLE I.—*Steam Engines.*

Description of Parts which are Believed to Have Given way First.	Average Previous to 19 5. Pr. Ct.	During 1905. Pr Ct.	During 1906. Pr. Ct.
Valves and valve gear	20.8	24.5	23.3
Spur gearing	14.8	17.0	12.0
Air pump motions	10.8	12.2	9.9
Air pump buckets and valves	7.3	7.5	6.9
Columns, entablatures, bedplates and pedestals	7.0	5.2	8.6
Cylinders, valve chests and covers	5.1	8.5	6.1
Bolts*	4.8	2.4	0.0
Parallel motions and links	4.6	1.9	2.7
Main shafts	4.5	2.8	5.2
Pistons, with their covers, rings and bolts	3.1	4.7	3.4
Governors and governor gear	2.7	0.9	1.7
Connecting rods, straps and bolts	2.3	3.8	5.6
Piston rod cross-heads	2.3	2.4	2.7
Flywheels	2.1	0.5	1.7
Air pumps and condensers	1.9	0.9	2.1
Piston rods	1.8	1.9	2.7
Crank pins	1.3	0.5	0.4
Cranks	1.1	0.0	0.0
Beams and side levers	0.9	0.5	0.4
Gudgeons in beams	0.8	1.9	0.8
Main driving ropes and belts	0.2	0.0	1.3
Total wrecks—cause not ascertained	0.2	0.0	2.1
Second motion shafts	0.1	0.0	0.4
	100.0	100.0	100.0

* These do not include bolts or pistons, air pump buckets, air pump valves, connecting rods, valve gear and other moving parts, the bolts in these parts being included with the parts themselves.

A number of serious flywheel failures are included in the year's returns. One case appears to have arisen through the sluggish action of the valve of a Corliss engine. This was closed by a spring coupled up to the dashpot in the usual way. The spring appears to have become gummed up with oxidized oil, and thus the valve, when released, failed to close promptly, steam being accordingly admitted during nearly the whole of the stroke, causing the engine to race, and this in turn resulted in the bursting of the flywheel. The latter, unfortunately, when it went to pieces, killed two men who were most courageously rushing to shut off steam at the stop valve; the material damage done was also very great. In another instance a serious flywheel disaster was prevented by the acuteness of the engine man, who noticed that two of the arms appeared to stand out from the boss about ¼ inch more than they should. These arms were hollow castings, having spigot ends secured into bored sockets in the boss by double cotters, which are commonly known as "fox keys" in the Lancashire district. The cause of the failure will be readily understood on reference to Fig. 1, which we reproduce from Mr. Longridge's report. It will be seen that the socket is cored out at the point where the cotters pass through it, so that the latter were subject to heavy bending stresses. Of course, no competent designer would use such a construction in the case of a cross-head or connecting rod end, but as the flywheel arms are not subject to alternating stresses, less care in the matter of avoiding bending strains on the keys appears to have been taken in this instance.

Another curious accident is shown in Fig. 2, which represents the gudgeon in the beam of a McNaughted engine. This failed, it will be seen, inside the casting, and this position of the fracture is characteristic of such breakages, a second having gone in the same position within the 12 months. No good explanation of this peculiarity has so far been advanced. As on the previous occasions, the absence or inadequacy of fillets on crankpins and journals has bred its annual crop of breakdowns. One case is particularly noteworthy. Here, apparently, by some workman's blunder, a sharp shoulder had originally been turned at the junction of the pin with the crank-web. To conceal the mistake a collar had been shrunk on and a fillet of noble proportions turned on this. When put to work, however, the false fillet, as may be readily understood, was incapable of preventing a serious concentration of stress on the re-entrant angle, and failure occurred, after a life of but 32 million revolutions. Some interesting experiments showing how seriously the absence of adequate fillets shortens the life of a bar exposed to alternating stresses were described by Dr. Stanton in *Engineering* for April 19. It was found in this investigation that a specimen having well rounded re-entrant angles could be loaded through double the range of stress at which failure occurred when the re-entrant angles were sharp corners.

One of the most valuable features of Mr. Longridge's annual reports is the collection of data as to lives of crank shafts. Such data are generally acquired in the laboratory under conditions which often differ essentially from those obtaining in practice. It is truly remarkable how low a working stress is necessary if a shaft, even of a slow running engine, is to have a really prolonged life.

In one case, noted in the report, a crank shaft gave way after a useful life of 293 million revolutions. The calculated maximum stress arising from combined twisting and bending is given as 6,450 pounds, but for four-fifths of its total life these were 15 to 20 per cent. less. Small fillets were used. In another instance a steel shaft failed after 227 million revolutions, the calculated maximum stress from the combined effect of twisting and bending being 8,200 pounds per square inch. Another wrought iron shaft failed after 193½ million revolutions under a maximum calculated stress of 7,920 pounds per square inch. The stresses given are, as stated, those calculated as due to the combined bending and twisting moments; but Mr. Longridge does not state what formula has been used in computing the moment equivalent to the combined effect of the twisting and bending. Of these formulæ there are three. Rankine held that a bar was capable of sustaining a certain maximum tensile stress, and gave accordingly the formula

$$M_E = \tfrac{1}{2} M + \tfrac{1}{2} \sqrt{M^2 + T^2} \qquad (1)$$

where M_E is the bending moment equivalent to the combined effect of the actual bending moment M and twisting moment T.

Some Continental elasticians, holding that the endurance of a bar was fixed by the amount of the maximum strain rather than the maximum stress, give

$$M_E = \tfrac{3}{8} M + \tfrac{5}{8} \sqrt{M^2 + T^2} \qquad (2)$$

and, finally, the modern school, maintaining the view that the maximum shear is the real determining factor, write

$$M_E = \sqrt{M^2 + T^2} \qquad (3)$$

Of these three formulæ, Rankine gives the lowest value to the equivalent bending moment, whilst the third of them is that making M_E the greatest, and this is believed to be the most accurate. The difference is considerable. If Mr. Longridge's stresses have been deduced by Rankine's rule, they would apparently be about 20 per cent. higher if calculated by formula number (3).

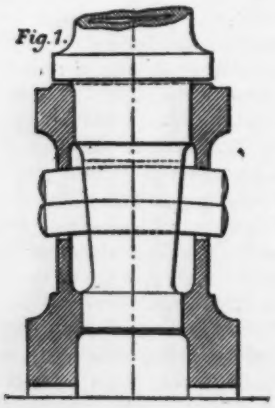
Mr. Longridge's classification of the accidents to gas and oil engines is given in Table II., annexed. Here it will be seen that fractures of main shafts constitute a considerable proportion of the total, though Mr. Longridge states that the percentage is diminishing, larger diameters being adopted by the makers. As the result of his experience he suggests that these shafts should always be of such dimensions that the quantity $\frac{C^2 (l + d)}{D^3}$ should be equal to 12 for engines with two bearings and overhanging flywheels. For engines with three bearings the constant should be 14, and here the expression $\frac{C^2 r}{a^3}$ should have a value of about 10. Here C denotes the cylinder diameter in inches, and the signification of the other letters is shown in Fig. 3, where *l*, it will be seen, is the clear distance between the bearings on each side of the crank shaft.

TABLE II.—*Gas and Oil Engines.*

Description of Parts which are believed to have Given Way First.	Average Previous to 19 5 Per Cent.	During 1905. Per Cent.	During 1906 Per Cent.
Valves and valve-gear	32.6	30.1	28.7
Cylinders and cylinder ends	16.6	15.9	16.7
Pistons	11.9	6.2	6.5
Connecting rods and their bolts	11.2	10.6	12.0
Main shafts	4.5	15.9	15.7
Governors and governor-gear	4.4	5.3	7.4
Silencing boxes and exhaust pipes	4.3	5.3	2.8
Flywheels and driving drums	4.3	3.5	4.6
Clutches and couplings	3.7	0.0	0.0
Frames and pedestals	2.8	2.7	0.0
Bolts*	2.7	0.9	0.9
Total wrecks—cause not ascertained	1.0	0.0	1.9
Main driving ropes or belts	0.0	0.9	1.9
Starting gear	0.0	1.8	0.0
Gas producer plants	0.0	0.9	0.9
	100.0	100.0	100.0

* These do not include bolts on pistons, connecting rods, valve gear, and other moving parts, the bolts in these parts being included with the parts themselves.

Fig. 1.



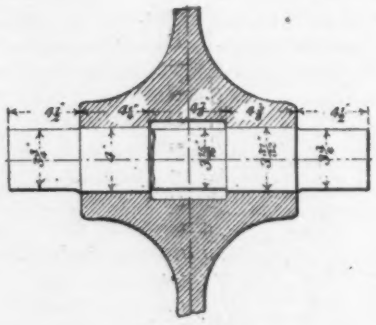


Fig. 2.

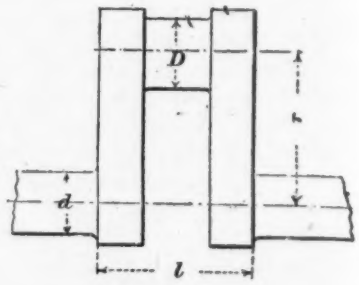


Fig. 3.

The causes of these breakdowns may be roughly classified as under:

	Steam Engines. Per Cent.	Gas and Oil Engines. Per Cent.
Accident or causes unascertained	28	34
Old defects or deterioration by wear and tear	36	23
Weakness, bad design, workmanship, or material	14	24
Negligence of owners or attendants	22	19
	100	100

Experience shows that marine type big ends for connecting rods are far from giving satisfactory results when applied to gas engines. The bolts are constantly breaking. At one time, no doubt, the stresses likely to come on them were underestimated, sufficient attention not having been paid to the stresses due to the inertia of the heavy trunk piston. These may be equivalent to a pressure on the latter of 30 pounds to 50 pounds per square inch. Even when these are taken into account, however, failures are not entirely avoided, and Mr. Longridge suggests that bending strains may arise from the inertia of the rod, and shows that in the case of one failure these may have given rise to a stress of 8,350 pounds at the point of fracture. This was just below the bolt-head, which, as usual, joined its shank with a sharp re-entrant corner. If the whole of this bending action was sustained by one bolt, as would be possible in case they did not accurately fit their holes, this calculated bending stress might well be doubled.

As regards electrical machinery, Mr. Longridge reports an improvement in the proportion between the number damaged and the number insured. To this makers have contributed by improved design and workmanship, whilst owners and their operatives are gaining experience as to the proper way to treat their electrical plant. The accidents reported on are classified in Table III.

TABLE III.—*Electrical Machinery.*

Description of parts which are Believed to have Failed First.	Dynamo 1905. Per Cent.	Dynamo 1906. Per Cent.	Motors. 1905. Per Cent	Motors. 1906. Per Cent.
Armatures and rotors	53	50	48	44
Magnet coils and stators	6	11	13	14
Commutators and brush gear	25	20	28	28
Miscellaneous	16	19	11	14
	100	100	100	100

Starting Switches and Controllers.	1905. Per Cent.	1906 Per Cent.
Resistance coils	48	48
Contacts and switch-arms	15	10
Automatic apparatus	13	17
Miscellaneous	24	25
	100	100

The causes of these breakdowns were probably as follow:

	Dynamos. Per Cent.	Motors Per Cent.	Starters. Per Cent.
Accidental	15	9	22
Dirt and neglect	14	19	11
Age and deterioration	21	25	23
Bad workmanship and design	23	18	9
Overloading	0	2	7
Unascertained	27	27	28
	100	100	100

Much trouble, it appears, has been experienced with foreign built commutators of bad design, of which, the report states, a considerable number find their way into the country.

Interstate Transportation by Pipe Lines.[1]

The first tariff to be filed covering the interstate transportation of Indian Territory crude petroleum by pipe line to Texas was issued on August 24 by the Texas Company, putting into effect on September 1 a rate of 25 cents a barrel on oil shipped from the Glenn pool to West Dallas and Eleanor, Tex., the latter being the point where the Texas Company's pipe line crosses the Gulf, Colorado and Sante Fe Railroad, about 10 miles south of Dallas. The lowest rail rate on shipments of Glen crude to Texas is 46.2 cents a barrel. The cost of gathering or loading the oil at the point of shipment is not included in either rate. For this service the Texas Company has fixed a charge of 20 cents where the distance is 15 miles, 15 cents where it is less than 15 miles and more than 10 miles, and 12½ cents where it is less than 10 miles.

In compliance with the amendment to the interstate commerce law of 1887 adopted by the last Congress, making pipe lines that are common carriers, in respect to interstate business, subject to the provisions of that law, a copy of the Texas Company's tariff was filed with the Interstate Commerce Commission. Additional tariffs, covering transportation through to the Gulf Coast, will be put into effect by the Texas Company when it completes its trunk line to Humble, joining the present system there and affording pipe line transportation through from the Glenn pool to Port Arthur. The Gulf Pipe Line Company, which has completed the laying of its 8-inch line from the Glenn pool to Sour Lake, where it connects with the Gulf Company's lines leading to Port Arthur, will file a through rate within a few days.

As the pipe lines are dealing with an entirely new question in endeavoring to comply with the law of 1906, making those that are classed as common carriers subject to the provisions of the interstate commerce act, this tariff and the regulations are of interest to all who are engaged in the oil business, and especially to producers operating in the Glenn field.

To apply the provisions of a law, framed exclusively to cover the transportation of passengers and commodities of all sorts by rail, or by rail and water, to the transportation of petroleum by pipe lines is rather a broad proposition. This fact is recognized by the Interstate Commerce Commission and by the heads of the Government departments who will have to deal with the matter. The amendment placing pipe lines under the law is embodied in section 1. Originally this section read: "* * * the provisions of this act shall apply to any common carrier or carriers engaged in the transportation of passengers or property wholly by railroad (or partly by railroad and partly by water when both are used under a common control, management or arrangement for a continuous carriage or shipment) from one State or Territory of the United States, or the District of Columbia, to any other State or Territory of the United States or the District of Columbia." The section was amended by inserting the clause covering pipe lines, as follows: "* * * the provisions of this act shall apply to any corporation or any person or persons engaged in the transportation of oil or other commodity, except water and except natural or artificial gas, by means of pipe lines, or partly by pipe lines and partly by railroad, or partly by pipe lines and partly by water, who shall be considered and held to be common carriers within the meaning and purpose of this act, and to any common carrier or carriers engaged in the transportation of passengers or property wholly by railroad, etc."

Commenting on the pipe line amendment, F. N. Judson, an

1. *Oil Investor's Journal.*

authority on interstate commerce law, says: "Some of the provisions of this act are made specifically applicable to railroads only, and others from their nature are clearly applicable only to railroads. As to owners of pipe lines who are not common carriers—that is, who do not do business for the public as such and who use their pipe lines solely for the interstate transportation of their own products, the clause is of doubtful application and validity."

Mr. Judson thus sums up the situation in a very few words. Pipe line transportation is similar to railroad transportation in the fact that a commodity is received and delivered; but in the manner of its receipt and delivery, the facilities for receiving and delivering and the possibility of delivering the identical article that is received, the two systems of transportation are wholly dissimilar. The pipe line transports its commodity in one direction. Unlike the railroad, it is unable to put in sidings that will permit the transportation of freight in both directions.

It is also manifestly impracticable for a pipe line to deliver the identical oil that it may receive for transportation. In the case of the Gulf line from the Glenn pool to Sour Lake it will require 125,000 barrels of oil to fill the pipe, and to operate the line from end to end it is necessary that it be full of fluid. To require the pipe line to deliver the identical oil received by it would mean that if a tender of 25,000 barrels were made it would have to go through separate from any other oil. If the pipe line company could afford to do business only for others, and to do it in small lots, such a scheme might work out all right; but where there is an investment of $5,000,000 to $7,000,000 in the line and its accessories the owners would be courting bankruptcy to attempt the delivery of identical oil.

Another point of difference—and this a very wide one—between pipe lines and railroads in the manner of delivery. A car of freight may be set out at any siding along a line of railroad, or freight may be unloaded from the car at any point on the main track, whereas oil calls for special facilities in the way of tankage, and the owner or shipper must be prepared to take care of it at the destination. It would be as unfair to require a railroad to provide storage for an indefinite period for all freight delivered to it as it would to ask a pipe line to store oil delivered to it for transportation until the shipper is ready to receive it at the destination.

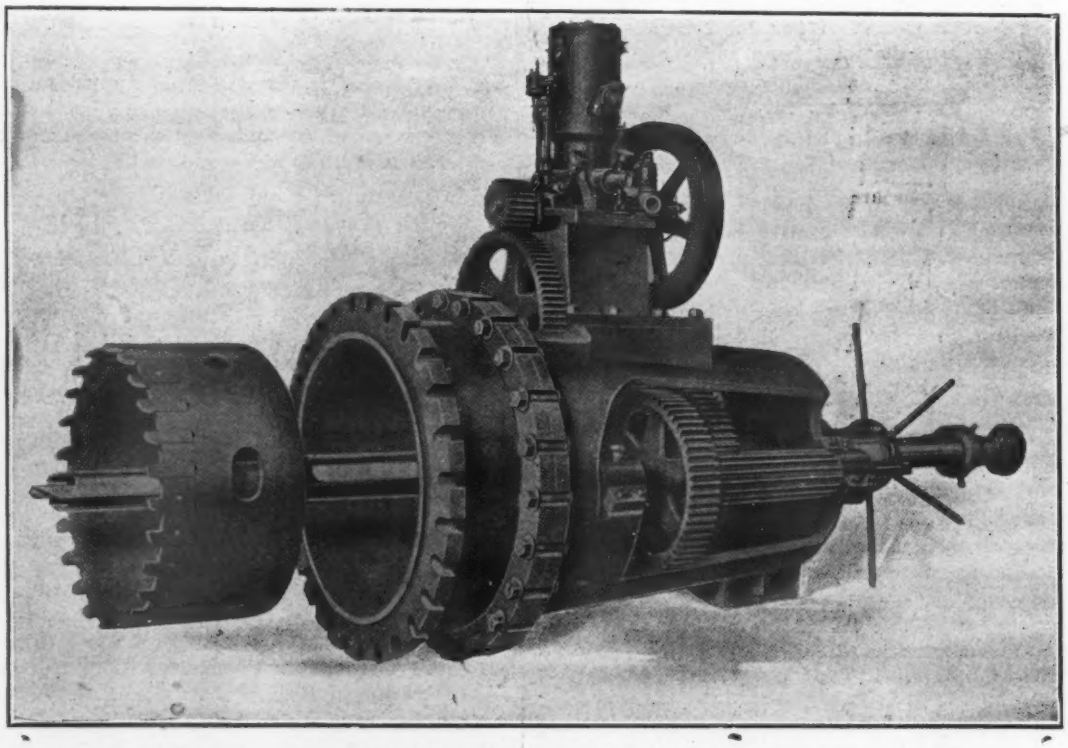
The pipe line companies are anxious to have the law reasonably and definitely interpreted in its application to them because they want to know "where they are at." As the matter now stands it is an untried proposition, and until it is worked out in practice it will remain a somewhat nebulous question. It goes without saying that difficulties will be encountered in endeavoring to apply a law, framed specifically for railroad transportation, to pipe lines.

In his talk at Tulsa recently, when he met the producers of the Mid-continent region, Secretary of the Interior Garfield, whose department has supervision over pipe lines in the Indian Territory, indicated his opinion when he said, in effect, that the application to pipe lines of the law governing common carriers was a new idea and that it remained to be seen whether conditions would be bettered by the efforts of Congress and the Government to regulate pipe line transportation. He added that results sometimes do not come up to expectations, and that no one should be disappointed if the results in this case failed to materialize as expected. Producers were thus warned, in so many words, not to expect too much from something that is as yet in an experimental stage.

A Water Main Tapping Machine.

The *Metal Worker* notes that a novel use for a small gas engine is its application to a tapping machine used for making connections with water mains. The Water Works Equipment Company recently built a machine capable of making a 30-inch connection with a 30-inch water main, which is operated by a 6½-horse power Mianus gasoline engine, and the innovation has proved so successful that the Company is now equipping its tapping machines of various sizes with gasoline engines for power drive in place of hand power operation.

The machine shown in the accompanying illustration was successfully used at Trenton, N. J., recently, in making a connection without shutting off the water in the main, and if substantiated the contention that with these machines branch connections of sizes ranging from small ones for domestic house service to a 48-inch branch can be made without shutting off the water. The machine and engine complete weigh about 5,500 pounds.



Gasoline Engine Driven Tapping Machine for Making 30, 36, 42 and 48-Inch Connections to Water Mains.

The engine is bolted to the frame of the tapping machine and the pinion on its shaft meshes a large gear operating a second pinion inside of the frame, which in turn drives the large gear exposed at the open side of the frame in the illustration. The latter gear is on the same shaft with a long pinion which meshes with a gear on the boring spindle and allows it to be shifted longitudinally as the feeding of the spindle progresses. The feeding of the spindle is accomplished by rotating the pilot wheel shown at the rear of the machine. At the cutting end of the boring spindle is a leading off drill, which guides a 4-inch cutter. The hole made by the latter is large enough to allow the shaft of the large cutter to be introduced, and a series of spring catches on the shaft serve to hold the piece of pipe after it is cut out by the 30-inch cutter.

To tap a main under pressure a sleeve and valve are used. The

sleeve is a special fitting of tee form, in which the cross or run of the tee is separable longitudinally on a central plane perpendicular to the side branch so that it may be bolted together, surrounding the main to be tapped, with the point where the hole is to come covered by the side branch of the tee. The valve is of any standard gate form, and is connected between the side branch and the flange of the frame of the tapping machine. After the connections are made and the valve opened the tapping operation is carried on within the branch.

In the work as done at Trenton a 1¼-inch hole was first cut in the main by the leading off drill and a 4-inch hole was made by the small cutter, thus allowing the main shaft of the 30-inch cutter to be inserted in the pipe. This cutter was then operated until the 30-inch hole was cut in the shell of the pipe. To cut the 1¼-inch hole and the 4-inch hole took 30 minutes, and to cut the 30-inch hole took 59 minutes. During the whole operation 2½ gallons of gasoline were consumed, which at 15 cents a gallon cost about 45 cents. When the piece of pipe cut out by the machine was removed past the gate the latter was closed until the machine was detached and the outer end of the valve was then connected up with the branch line.

The sleeve supplied by the Water Works Equipment Company has a special flanged joint for securing the halves together, and is arranged to use cement instead of lead for filling the bulk of the space between the cast iron sleeve and the main pipe. At the hubs or bells it is necessary to use lead. The sleeve flanges, instead of having a full bearing against each other where they are bolted together, touch only at the outside edges, leaving a space of triangular cross section between them. The joint faces are about 1½ inches wide, and between them a ¼-inch lead gasket is placed. When the bolts are tightened more pressure is brought upon the joint faces and the gasket than would be the case if the full face of the flanges were in contact.

Gaster, on Developments in Electric Incandescent Lamps.

In a paper on this subject, read by Mr. Leon Gaster in Section G of the British Association for the Advancement of Science, at the recent Leicester meeting of that body, the author gave a short description of the latest developments made in the manufacture of incandescent electric lamps, and exhibited, amongst others, samples of graphitized carbon lamp, the Gem, Nernst, Osmium, Tantalum, Osram, Tungsten, Yust and Hannaman's lamps, Kuzel, Zircon-Wolfram (several types), including also a sample lamp called by the inventors (Prof. Parker and Mr. Clark) the "Helion" lamp, and shown for the first time in England. Owing to the high efficiency of these lamps, Mr. Gaster predicted that the expense for electric lighting will be greatly reduced in the near future, and that better illumination will be obtained. Some of the lamps shown consume less than one-third of the energy required by the ordinary carbon incandescent lamps, which means enormous saving. The progress made this year was remarkable. Many manufacturers on the Continent are ready to supply large quantities of these new metal filament lamps, and in England the Robertson Lamp Manufacturers are extending their works with a view of making these lamps here. The "Z" Electric Lamp Syndicate are about to manufacture the filaments to be used in the "Zircon-Wolfram" lamp in this country. Mr. Gaster pointed out the desirability of lamp makers supplying lamps combined with suitable shades and reflectors in one unit so as to assist consumers in obtaining any desired effect of illumination, either by concentration or diffusion. Particular attention was drawn to the need for manufacturers and large consumers of light to adopt proper methods of illumination, the advantages of this being many, viz.: First, the sight of the people will be improved and prolonged; secondly, the output will be quite appreciably increased; and thirdly, the quality of the work done under proper illumination will be of the same standard as when done in the daytime. The economies derived by not using proper methods of illumination are false economies, when one bears in mind the fact that the expense of providing and keeping up proper illumination is in most cases only a small fraction compared with the value and the nature of the work turned out. This question of defining the proper amount of light necessary for different purposes will form the work of the illuminating engineer. For the creation of this new specialist the author is a strong advocate.

Reference was made to the useful work for improving the quality of incandescent lamps, and towards helping the consumers in obtaining more satisfactory illumination done by the Engineering Department of the National Electric Lamp Association, and by the Electric Testing Laboratories of New York.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

MR. RUSSELL S. FEURTADO, of Fergus Falls, Minn., has been employed by the Corporation Attorney, of St. Paul, Minn., to make an examination as to the cost of manufacturing and selling in St. Paul, the testimony to be presented to the City Council, prior to the voting by the latter on the ordinance which proposes to put the legal rate for gas in that city at 85 cents per 1,000 cubic feet.

MR. DAVID ELDER has been appointed Superintendent of the Three Rivers (Mich.) Gas Company. Mr. Elder was formerly connected with the Western United Gas and Electric Company, as Manager of its Aurora (Ills.) branch, and later on was in charge of construction work on the new gas plant at Beardstown, Ills.

THE Suburban Gas Company, of Chester, Pa., has extended its mains to and through the outlying suburb of Cardington.

THE Shamokin (Pa.) Gas Company has been organized by Messrs. John Mullen, Geo. C. Graeber, F. P. Llewellyn, J. W. Gillespie and E. M. Leaner. It is capitalized in $10,000 as a beginning.

MR. W. B. STRAIN has been appointed Manager of the Baker City (Ore.) Gas Company.

DURING the year the Nashville (Tenn.) Gas Company has extended its distribution system by the addition thereto of 16 miles of mains.

THE new net selling rate of $1 per 1,000 cubic feet by the Bridgeport (Conn.) Company, became effective the 1st inst. The gross is $1.10 with 10 cents off for payment within 10 days.

MR. LEWIS ROSSIGNOL has resigned from the counting room of the Augusta (Ga.) Gas Light Company. He will engage in business on his own account.

A CORRESPONDENT in Wichita, Kas., forwards the following: "Under the capable management of Mr. H. R. Brokaw, the Emporia Electric and Gas Company has made noticeable growth, which incidentally means a better Emporia as well as a stronger and better gas company. The gas service in Emporia to-day is one of the best in the State, and Mr. Brokaw, who came to Emporia from New Jersey, and has had charge of the Company since April 1st, deserves credit for the work he is carrying on. The new Humphrey arc lights in front of the stores on Commercial street, for which he is directly responsible, are a great improvement to the town."

THE Board of Assessors of Providence, R. I., in making up the tax lists for 1908 have assessed the properties of the Providence Gas Company in the sum of $2,084,740.

ADVICES by way of Boston, dated the 7th inst., are to the effect that Mr. James L. Richards, President of the subsidiary companies of the Boston Suburban Electric Companies, succeeded Mr. Samuel L. Powers, who resigns to devote all his time to his law practice. Mr. Powers has been President of the Boston Subsidiary Companies only a short time, filling the vacancy caused by the resignation of Mr. Adams D. Claflin, who resigned to devote his entire attention to the care of the Claflin estate. Mr. Claflin, however, continues as President of the Boston Suburban Electric Companies, which is the holding Company.

"W. T. M.," writing to the JOURNAL last Monday, says: "The second annual outing of the Commercial Department of the Boston Consolidated Gas Company was held at Paddock's Island last Saturday. The party numbered about 100, and sailed from City Point at 10 A.M., aboard the handsome yacht Rosebud. Ex-Senator Colbert led a quartet who added greatly to the enjoyment of the trip. The list of sports included a baseball match between the married men and the bachelors, the latter winning by a score of 13 to 4. Last year it was different, when the should-stay-at-homes were returned the victors. After the game a most satisfying meal was put away, the direction of which was in the capable hands of the ex-Senator. The speech of the spread was made by that Prince of persons, P. E. Oakley, and the singing by the Joyce quartet caused much rejoicing. Four of the four athletic events were won by George F. Mullen, whose finish in the potato race was acclaimed to the tune of 'The Wind that Shakes the Barley.' Not a flaw marked the festivities."

WE regret to announce that, owing to continued ill-health, Mr. Charles Ennis has been compelled to resign the Superintendency of the Worcester County Gas Company, of Warren, Mass.

THE St. Joseph (Mo.) Gas Company will speedily be in the market for an additional storage holder. The incident of July 14th last has practically convinced the "most conservative" member of the Board that the hand-to-mouth plan is not always the wisest one.

WORK on the new gas plant for the Decatur (Ills.) Railway and Light Company will be started next month. There does not seem to have been any particularly good reason why it should not have been commenced last month.

GENERAL MANAGER R. M. SEARLE, of the Rochester (N. Y.) Railway and Light Company, is handicapped in the completion of his scheme for the equalizing of distribution pressures in Rochester through the inability of the pipe mills to make even reasonably prompt deliveries of pipe exceeding 6 inches in diameter.

MR. WM. F. DUNN, whose resignation from the post of Superintendent of the Peoples Light and Power Company, of Moline, Ills., was made to enable him to take charge of the new works at Beardstown, Ills., was, just prior to his leaving, presented by his Moline associates with a diamond watch charm.

THE authorities of Williamstown, Mass., have granted the Williamstown Gas Company the right to extend its lines from Henderson Road to Sand Springs.

THE special election held a fortnight or so ago in Great Falls, Mont., to determine whether or not the gas franchise issued to Wm. Darst & Son. of Chicago, some weeks ago, should be indorsed, was all in favor of the project.

"DRYING Materials in Industrial Plants" is the title of a pamphlet recently issued by the Green Euel Economizer Company, of Matteawan, N. Y., which discusses the drying of various materials, such as fabrics, clothing, malt, lumber, paper, paper pulp, sugar, etc. Besides describing and illustrating the fans, blowers, steam coils, etc., manufactured by the Company for use in drying plants, an interesting account is given of the philosophy of drying and the text is illustrated by drawings and photographs of drying plants for many different purposes. This pamphlet also describes the Green air heater, which utilizes the waste heat in the flue gases from boiler or other furnaces for heating and drying purposes.

THE Gas Bench Construction Company, of St. Louis, Mo., has recently been awarded contracts for bench work at Coldwater, Albion and Ishpeming, Mich.; Independence, Mo.; Winona, Minn., and Salem, Ore. The Company is also to furnish high grade material for 6 benches of 9's, throughs, for the Rockford (Ills.) Gas Light and Coke Company.

IN a formal bid submitted some days ago to the Board of Awards, Baltimore, Md., the Consolidated Gas Company, of that city, offered to continue supplying gas to the street lamps at the prevailing rate of 72½ cents per 1,000 cubic feet, the rate for gas used in the public buildings to be 85 cents per 1,000. It was stipulated, however, that hereafter the city shall pay $2, and all other necessary expenses, for each lamp post it orders removed, and $5, plus necessary expense, for each new lamp ordered put in service.

HERE is another sample ordinance that concerns one of our "great and rapidly growing" more than Middle-West centers of population, which was furnished us, as to its essence, by "V. M. B.," under date of the 7th inst.: "An ordinance introduced to the Council of Grand Forks, N. D., last week, which is designed to regulate gas charges there, provides that no Company selling gas in Grand Forks shall charge a higher rate on lighting account than $2.30 per 1,000 cubic feet, or $2 per 1,000 for a supply on cooking, heating or power accounts; and where gas is used for domestic purposes the charge for lighting, in the same house, shall be the lower charge. Prompt payment of accounts within 10 days shall entitle the user to a rebate of 50 cents per 1,000."

MESSRS. MAURAL & CO., who are acting in the capacity of engineers in charge or construction for the syndicate which is to construct and operate a gas plant in Burlington, Wis., aver that the works will be in going order by January 1st. It looks to us that if the supply is laid on by March 1, 1908, the projectors of the Burlington gas system will have done well. The engineers have planned for a plant up to a daily output of 65,000 cubic feet. The site is purchased.

T. B. LARIMEE is informed that the gas plant to be put in operation at Richmond, Ills., as per the public ballot recently cast on such account, is to be of the greased air type.

AT the annual meeting of the Concord (N. H.) Gas Light Company no change was made in the personnel of the management.

THE new double-lift holder which the Davis & Farnum Manufacturing Company is constructing for the Great Falls (N. H.) Company will be completed by November 1st.

HERE is a strange determination, the account of which came to us by way of Boston the morning of the 10th inst.: "The Chelsea (Mass.) Board of Aldermen has refused the Boston Consolidated Gas Company permission to open the streets for laying pipes between Everett and East Boston. The bill was returned to the Gas Company with the memorandum attached that the action would be reconsidered if provisions were made that Chelsea labor only would be employed on the job, and that a like rate for gas to that charged in Boston proper should be made effective in Chelsea."

THE Chattanooga (Tenn.) *News* says that the Chattanooga Gas Company has finished its contract for equipping the custom house with improved, up-to-date gas lamps, replacing lamps of the incandescent electric type. Gas is to be used throughout the building.

MR. ROBERT CUNNINGHAM, Manager of the Youngstown (O.) Gas and Electric Company, was the host early this month at "a party" given by him to the employees of the electrical division of that corporation. The party was of the right variety, too, since it included a dinner at Idora Park, and later on a view of the performance at the Casino Theater.

HERE is the story of the balloon ascension, made the morning of the 2d inst., from the yards of the North Adams (Mass.) Gas Company, as per the headlines to the complete narrative which was given in the North Adams *Herald* of the 3d inst.: "North Adams gas ideal, said Handler after the trip. Noted German balloon expert makes great flight, accompanied by N. H. Arnold, of North Adams. Airship and men cover 140 miles. Were above the clouds for most of the 3½ hours they were in the air. Started from here early Sunday morning and landed in Westchester, Conn. Handler so pleased with reception here, and experience with North Adams gas, that he will come back shortly for another flight. Stevens comes back again this week." All of which goes to show that General Richardson can be safely counted on to furnish the right material at the right time. It may be that the General is thinking of trying an ascension, wherefore his desire to be sure that the gas which will lift him from his feet shall be devoid of N and O.

A CORRESPONDENT in Seattle, Wash., incloses us the following which came to him by way of Bellingham under date of August 31st: "The Whatcom County Railway and Light Company is now giving consideration to the advisability of using oil instead of coal in the manufacture of gas. Manager L. H. Bean has just received word from the Pacific Coast Company, from whom the local concern gets its coal, that after the expiration of the Gas Company's present contract with the coal corporation, December 1, no contract to supply fuel here will be entered into except at an increase of 60 per cent. This notice of advance has caused Messrs. Stone and Webster seriously to contemplate the installation of machinery for the manufacture of gas under the water gas system. The change will be expensive, however, and before determining whether such a change shall be made, the local Company has asked from the Whatcom Coal Company, which has leased the Blue Canyon mine, a proposition to furnish from 4,000 to 6,000 tons of coal annually. If a contract for this amount of coal is entered into between these two Companies it will mean much to this city. In anticipation of the possible substitution of oil for coal, the Whatcom County Railway and Light Company has withdrawn its coke from the market, and is hoarding it, to be used if oil furnaces are installed. The coke, of course, will be utilized in the generating apparatus."

THE City Council, of Columbus, Ga., has asked the Georgia Railroad Commission to fix the following rates for gas and electric currents in that city: Gas, 75 cents per 1,000 cubic feet; electricity, 10 cents per kilowatt hour. How is that for purposes of confiscation, all things considered.

HE shall hereafter be known as Commodore Barret. Reason therefor; he is the owner and skipper of a motor boat.

THE AMERICAN GAS LIGHT JOURNAL

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NOTIFICATION RESPECTING ADVERTISING.

Orders for new advertising, or for changes in standing advertisements, to insure attention in the issue following their reception, must be in hand any time of Wednesday.

MONDAY, SEPTEMBER 16, 1907.

The Market for Gas Securities.

The market for city gas shares was last week as it has been for 6 months past. Doubt and indecision are the ruling factors in determining quotations, and the trading is of most limited sort. In the main, however, comparing last week with its predecessor, the nominal figures have been fairly well maintained. In the light of attacks on vested interests which are of kindred character to those which the gas interests of New York have been subjected, and which have been survived by-the-way, there is little to say respecting actual market values as represented by the nominal quotations.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY

SEPTEMBER 16

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$73,177,000	100	101½	102
Central Union Gas Co.—				
1st 5's, due 1942, J. & J.	3,000,000	1,000	92	97
Equitable Gas Light Co.—				
Con 5's, due 1932, M. & S.	1,000,000	1,000	..	115
Mutual	3,500,000	100	150	180
New Amsterdam Gas Co.—				
1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	80	91
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	37	43
1st Mtg. Gold 5's	1,000,000	..	98	104
Northern Union—				
1st 5's, due 1927, J. & J.	1,250,000	1,000	101	103
New York and East River—				
1st 5's, due 1944, J. & J.	3,500,000	1,000	100	105
Con. 5's, due 1945, J. & J.	1,500,000	..	97	101
Standard	5,000,000	100	70	110
Preferred	5,000,000	100	100	125
1st Mtg. 5's, due 1930, M. & N	1,500,000	1,000	100	105
The Brooklyn Union	15,000,000	1,000	100	110
1st Con. 5's, due 1948, M. & N	15,000,000	..	.	102
Yonkers	299,650	500	130	..
Out-of-Town Companies.				
Bay State	50,000,000	50	¼	⅜
" Income Bonds	2,000,000	1,000	..	75
Binghamton Gas Works	450,000	100	..	65
" 1st Mtg. 5's	500,000	1,000	95	100
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	5	8
" " Bonds, 5's	5,250,000	1,000	63	66
Capital, Sacramento	500,000	50	..	35
Bonds (6's)	150,000	1,000	..	..
Chicago Gas Co. Guaranteed Gold Bonds	7,650,000	1,000	104	106¾
Cincinnati Gas and Electric Co.	29,500,000	100	95	95¼
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	92	98
Columbus (O.) Gas Lt. & Heating Co	1,689,750	100	87	88
Preferred	3,036,500	100	102¾	103
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	11,000,000	100	..	90
Mortgage, 6's	3,000,000	..	..	115
Chesapeake 1st 6's	1,000,000	..	..	..
Equitable, 1st 6's	910,000	..	..	..
Consolidated, 1st 5's	1,490 000	..	..	112
Consolidated Gas Co. of N. J.	1,000,000	100	15	17
Con. Mtg. 5's	880,000	1,000	92	95
Bonds	75,000	..	..	100
Detroit City Gas Co.	5,000,000	50	..	50
" Prior Lien 5's	4,618,000	1,000	..	98
Detroit Gas Co., 5's	351,000	1,000	75	80
" Inc. 5's	16,000	100	98½	100
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Essex and Hudson Gas Co.	6,500,000	..	39	40
Fort Wayne	2,000,000	..	..	..
" Bonds	2,000,000	..	55	..
Grand Rapids Gas Lt. Co. 1st Mtg. 5's	1,225,000	1,000	104½	105
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	..	101	103
Bonds, 5's	10,500,000	..	101	102½
Indianapolis	2,000,000	..	60	70
" Bonds, 5's	2,650,000	..	104½	105
Jackson Gas Co.	250,000	50	82	..
" 1st Mtg. 5's	200,000	1,000	97	100
Kansas City Gas Light Co., of Missouri	5,000,000	100	..	36
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede, St. Louis	10,000,000	100	..	05
Preferred	2,500,000	100	95	110
Bonds	10,000,000	1,000	104	104½
Lafayette Gas Co., Ind.	1,000,000	100	..	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	143	145
Madison Gas & Elec. Co. " 1st Mtg. 6's	350,000	1,000	106	108¾
" 6 per cent. scrip, due 1910	100,000	25	60	60¾
Massachusetts Gas Companies of Boston	25,000,000	100	51	51¼
Preferred	25,000,000	100	80	81
Montreal, Canada	2,000,000	100	218	218¾
Nashville Gas Lt. Co.	1,000,000	100	110	..
Newark, N. J., Con. Gas Co.	6,000,000	..	56	58
Bonds, 6's	6,000,000	..	137	138
New Haven	2,000,000	25	200	..
Peoples G. L. & Coke Co., of Chicago	25,000,000	100	86¾	87
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	20,100,000	1,000	..	..
" 2d "	2,500,000	1,000	104	..
Rochester Gas & Elec. Co.	2,150,000	50	88	..
Preferred	2,150,000	50	118	..
Consolidated 5's	2,000,000	..	104½	105¼
San Francisco, Cal.	15,800,000	00	..	..
St. Joseph Gas Co. 1st Mtg. 5's	751,000	1,000	92	..
St. Paul Gas Light Co	1,560,000	100	43	47
1st Mortgage 6's	650,000	1,000	113	116
Extension, 6's	600,000	1,000	112½	115
General Mortgage, 5's	2,465,000	1,000	96¼	..
Syracuse, N. Y.	1,975,000	100	50	55
Bonds	2,047 000	1,000	102	..
Washington, D. C	2,000,000	20	350	355
First mortgage 6's	600,000	..	..	..
Western, Milwaukee	4,000,000	..	..	..
Wilmington, Del.	600,000	50	230	..

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DIVIDEND NOTICE.

OFFICE OF THE UNITED GAS IMPROVEMENT CO., N. W. CORNER BROAD AND ARCH STS., PHILADELPHIA, PA., Sept. 11, 1907.

The Directors have this day declared a quarterly dividend of 2 per cent. (one dollar per share), payable Oct. 15th, 1907, to stockholders of record at the close of business, Sept. 30, 1907. Checks will be mailed.

1684-5 LEWIS LILLIE, Treasurer.

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GAS BOOKS WANTED.

My library of gas books and subjects akin thereto, and which I believe was the most complete in existence, was destroyed in the April 18, 1906, San Francisco disaster. In re-establishing this library, which will find an ultimate home with a gas association or educational institution, I am desirous of securing all available gas literature printed in the English language, including technical works, reports, pamphlets, etc., and will purchase such as I do not yet possess. Those having such works will accommodate me by sending a description thereof, stating condition of volume and net price desired, carriage included. L. P. LOWE,
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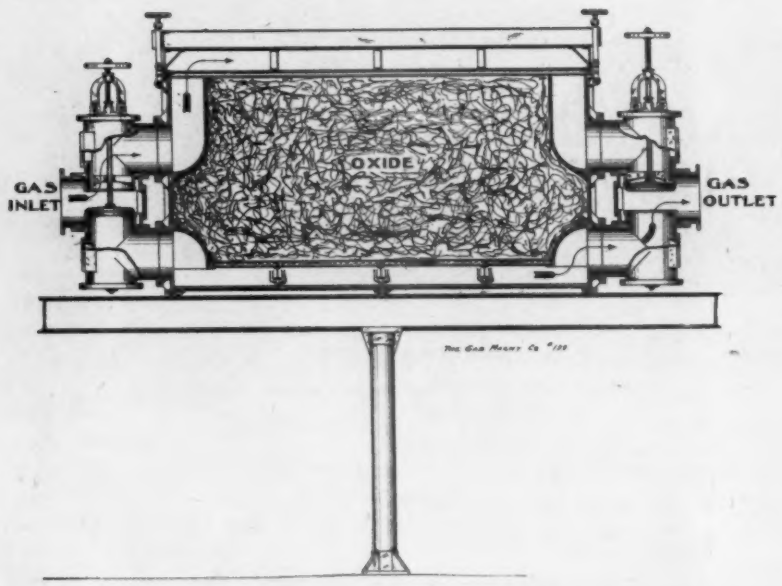

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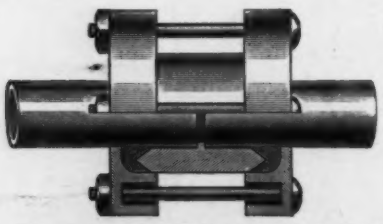
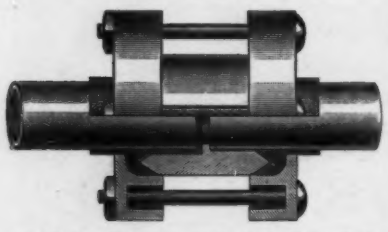
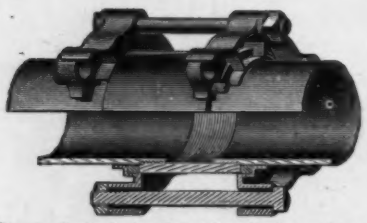
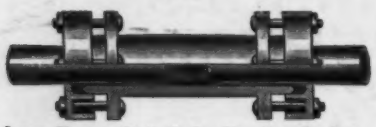

Regular Coupling, Style 1, for Plain End Wrought Iron Pipe.


Insulating Coupling, Style 5, for Plain End Wrought Iron Pipe.


Clamp, Style 4, for Repairing Leaks on Screw Collar.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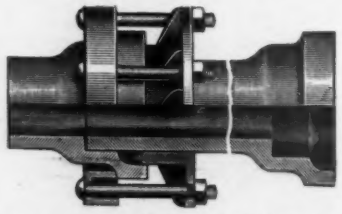
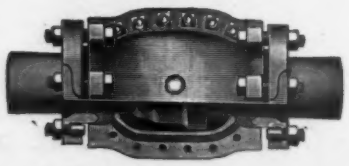
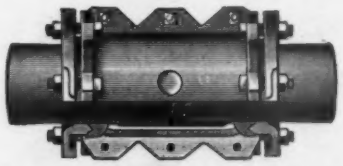
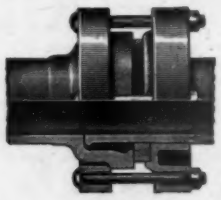

Coupling, Style 9, for Special Style Cast Iron Pipe.


Split Sleeve for Repairing Broken Bell on Cast Iron Pipe.


Split Sleeve for Repairing Broken or Cracked Cast Iron Pipe.


Clamp, Style 4½, for Repairing Leaky Lead or Cement Joints in Cast Iron Pipe.

No. 1 Plain — No. 1 Wired
For No. 1, 2, 4 and 5 Lamps.

Bijou. — Bijou Wired.
For No. 3 (Bijou) Lamp.

"Rico" Mantles.

Ramsdell

Our Mantles are the Standard Inverted Mantles, just as the RAMSDELL is the Standard Inverted Lamp. They are manufactured especially for the Ramsdell Lamps, being made of double woven Ramie and bearing our Trade Mark "RICO." Being made on our patented Mantle Ring, a firm hold is obtained on the porcelain cone, which prevents the mantle being jarred off the holder. This is an important feature of the "Rico" Mantles, and is one of the points which makes them the best mantles produced.

We have the exclusive control for the United States and Canada of the Farkas patents, covering the WIRE CAGED MANTLES such as are used abroad for Railway Car Lighting. This Mantle has been extensively used by us in the past two years on the Ramsdell Inverted Arcs and on other lamps where they are subjected to unusually severe requirements.

RAMSDELL INVERTED GAS LAMP CO., 530 Broadway, New York.

THE UNITED STATES.

PATENTED MAY 13, 1902.
"Self-Draining Meter."

THE UNITED STATES
Self-Draining Meter.

NO DUMPING OF METERS TO GET THE WATER OUT.

Saves Over 75 Per Cent. in Cost Annual Repairs.

Prices low. Extra heavy tin used. Demonstrations at our expense. Send for circular.

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Are the Most Perfect of Any.

SOME EXCLUSIVE FEATURES.

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4. Multiple levers of thermostat all incased. Cannot be disturbed.
5. Simplest Automatic Valve ever made. Can't get out of order.

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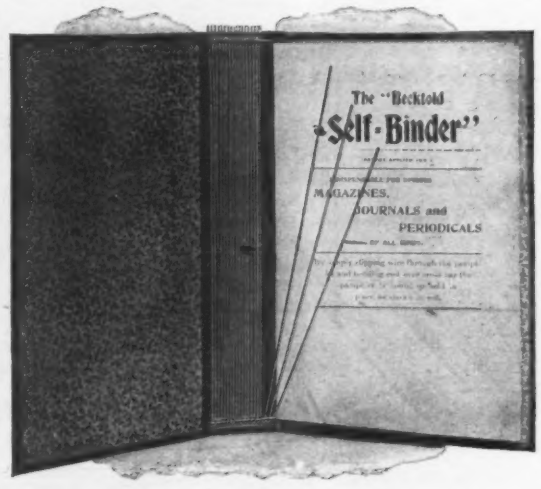

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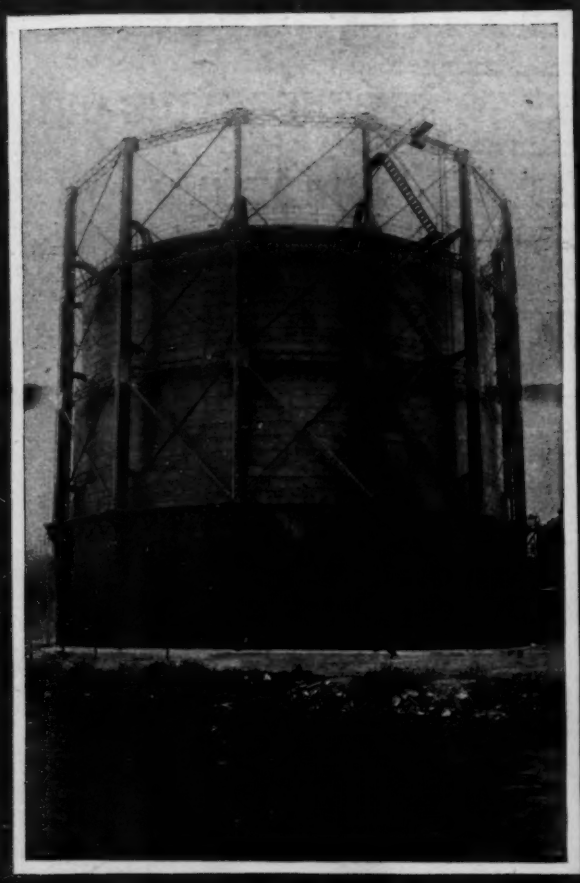

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TRIPLE
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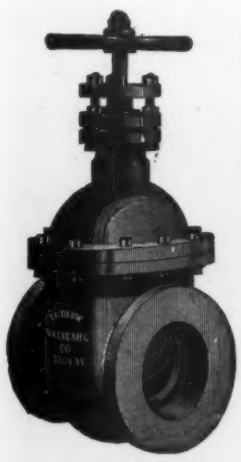

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TROY, N. Y., U. S. A.
Double and Single Gate Valves, ¼" to 72",
—FOR—
Gas, Water, Steam, Oil, Ammonia, Etc.
HOT GAS VALVES A SPECIALTY.
Send for Catalogue.

HUNT CABLE RAILWAYS
For Handling Coal and Coke in Gas Works.

The cost of handling coal and coke by this method is only the expense of loading the cars (one man) and the power to drive the cable. Every inch of ground is available, as the space under the trestles can be utilized for storage, if necessary. These railways are built of different types, to handle any quantity of material, large or small.

If you are interested in the subject, we will take pleasure in sending you photographs of some of the plants we have installed upon receipt of your card, and will give such information as is in our power if you will let us know your requirements.

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CAPTAIN WILLIAM HENRY WHITE,
WILL CONTINUE THE BUSINESS OF
CONSULTING ENGINEER
For Gas, Water and Electric Light Companies, at
No. 41 Wall Street, Room 1707, New York.
TELEPHONE, 5534 BROAD.

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HENRY MAURER & SON,
Manufacturers of
High Grade Firebrick, Blocks, Tiles,
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Works: Maurer, N. J. Office: 420 E. 23d St., N. Y. City.

Bristol's Recording Pressure Gauges
—(ALL RANGES).—
Used the World Over.
Necessary Equipment

Write for Catalogue A.
For Every Gas Plant.
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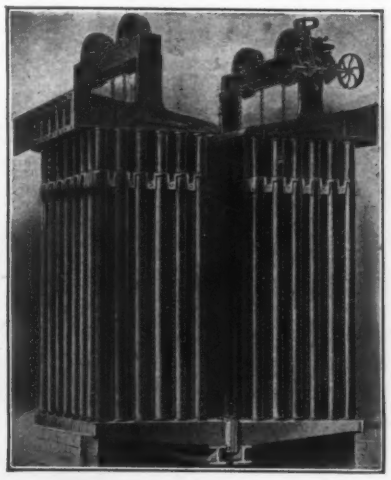
The Bristol Co., Waterbury, Conn., U S.A.



HOW MUCH COAL PER 1,000 CU. FT. OF WATER GAS?

If the process of making water gas were theoretically perfect, only 24 lbs. of coal would be consumed per 1,000 cu. ft. of gas generated. As a matter of fact, the actual figures are between 40 and 48 lbs. per 1,000 cu. ft. It is apparent that there is a waste somewhere, and if you will take the trouble to put a thermometer over the stack valve during the "blowing up" period, you will see where the heat goes to. From one-third to one-half of the heat escapes to the atmosphere, either as sensible heat or latent heat of combustion. If use can be found for this heat a great economy could be effected immediately.

We have found such a use. By means of the Green Air Heater 12 per cent. to 15 per cent. of this heat, or more, can be imparted to the air blown to the generator. This will reduce the time for blowing up and increase the temperature of the generator, so that about the same proportion of coal will be saved.

After the gases have passed through the air heater they are still hot enough to use in a Green Fuel Economizer to heat the boiler-feed water up to the evaporative point. In In this way a quarter of the boiler coal can be saved. In connection with a 6-ft. generator an investment of $3,500 in an Air Heater and an Economizer will save from $2,300 to $2,500 per year. This ought to repay you for the trouble of writing us for further information. Ask for Circular "AG."

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12-inch High Pressure Governor.

REYNOLDS' GAS REGULATOR COMPANY,
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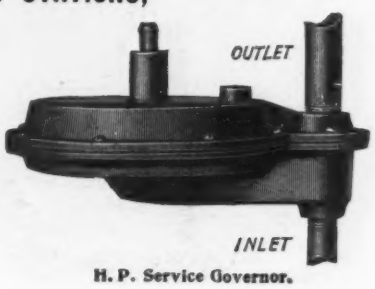
We make all sizes for all classes of reduction,
DOUBLE and SINGLE DISTRICT STATIONS,
And Individual Service Governors for Reducing High Pressure.
HOLDER GOVERNORS
And Low Pressure Regulators, all of the Dry Diaphragm type.
Write for Catalog.



H. P. Service Governor.

LLOYD CONSTRUCTION COMPANY
LLOYD'S MOUTHPIECES
DETROIT—MICHIGAN

Are all carried by adjustable hangers.

Absolutely no weight on the retorts.

WHY DO GAS EXHAUSTERS

AND HIGH PRESSURE GAS PUMPS BUILT BY

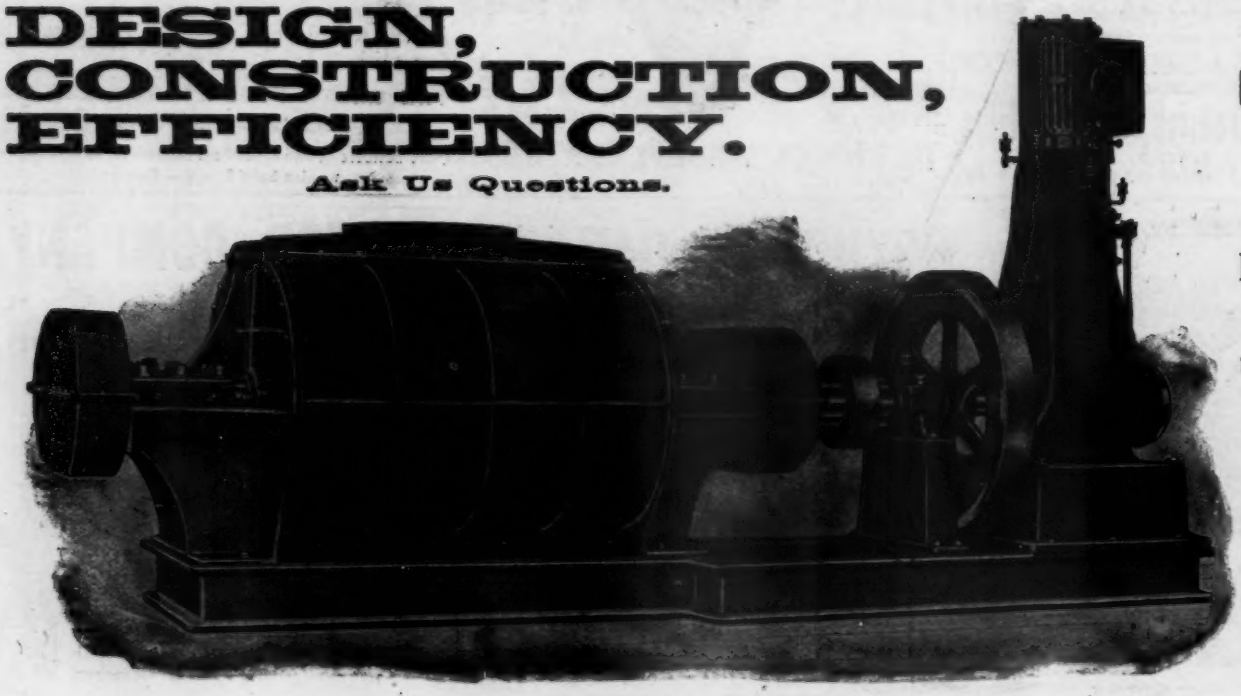
THE CONNERSVILLE BLOWER CO.

Stand so High in the estimation of those using them?

THE ANSWER IS IN THREE WORDS:

DESIGN, CONSTRUCTION, EFFICIENCY.

Ask Us Questions.



Home Office:
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Something Entirely New.

ROOTS' GAS EXHAUSTERS.

Installation showing our latest improved machines, with flexible rope coupling, for large units.

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Shows up GOODS as they ARE

Have you Seen the
WHITE AND GOLD ENAMELED HUMPHREY ARC?
Handsome, Durable, High Power.
Sure to Bring in New Lighting Business.

GENERAL GAS LIGHT CO.,
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46 West Broadway.
SAN FRANCISCO:
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GEORGE ORMROD, Pres. & Treas. JOHN D. ORMROD, Supt.
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MANUFACTURERS OF

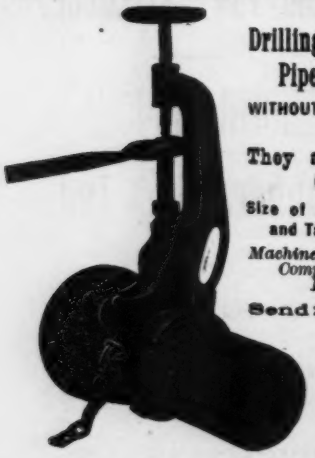
CAST IRON PIPE AND SPECIAL CASTINGS

FOR WATER AND GAS.

Also, FLANGE PIPE, LAMP POSTS, Etc.

GAS TAPPING MACHINES

—FOR—



Drilling and Tapping Pipe under Pressure

WITHOUT ANY ESCAPE OF GAS.

They are Strong and Compact.

Size of Combination Drills and Taps ¾ to 4-inch.

Machines Sent to any Gas Company for Thirty Days' Trial.

Send for Circulars.

Geo. Light,
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"THE MINER"

Globe Street and Boulevard Lamps.

Cheapest and Best

THOUSANDS IN USE WITH INCANDESCENT BURNERS.

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Plans prepared and Estimates furnished at short notice.

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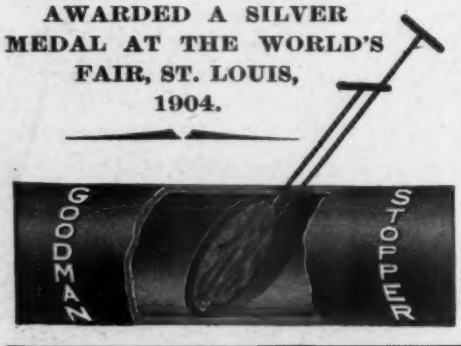
FROM THREE TO FORTY-EIGHT INCHES DIAMETER. ALSO, ALL SIZES OF

Flange Pipe for Sugar House and Mine Work. Branches, Bends, Retorts, etc., etc.

AWARDED A SILVER MEDAL AT THE WORLD'S FAIR, ST. LOUIS, 1904.



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Chollar's System of Gas Purification.

THE PURIFIED GAS REVIVES THE FOULED OXIDE.

The Follett Time Stamp

Can be Used for so Many Purposes it would Take a Book to Name them. . . .

Address,
A. ANDERSON, JR.,
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Practical Handbook on

GAS ENGINES,

With Instructions for Care and Working of the Same,

By G. LIECKFELD, C.E.
Translated with Permission of the Author,
By GEO. M. RICHMOND, M.E.

Price, $1.

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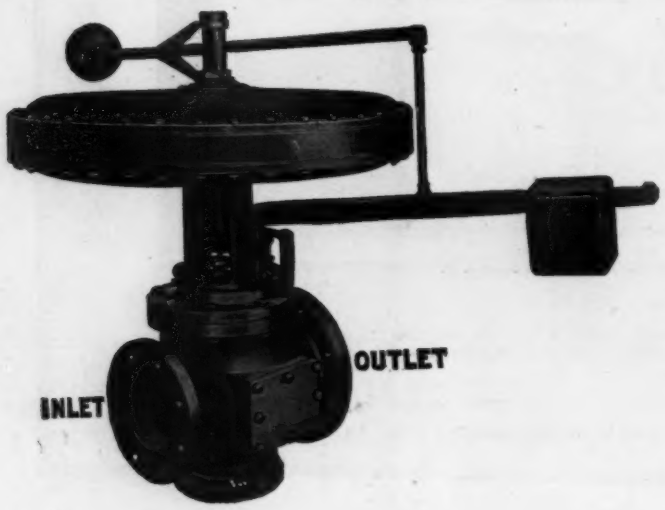

THE FULTON GAS PRESSURE GOVERNOR,

WITH AUTOMATIC SAFETY CUTOFF.

For Artificial or Natural Gas.
For District or Service Use.

Our DUPLEX SENSITIVE GOVERNOR, with Automatic Cutoff for district service, will reduce high pressure gas to inches of water without variation.

Absolutely safe and reliable. No complicated mechanism to get out of order. More than 20 years' experience with the largest gas companies.

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28-30 PENN AVE., PITTSBURGH, .

AMERICAN METER CO.,

NEW YORK, ST. LOUIS, PHILADELPHIA, SAN FRANCISCO, CHICAGO,

Photometrical and Experimental Apparatus.

PUBLIC LIGHTING TABLE.

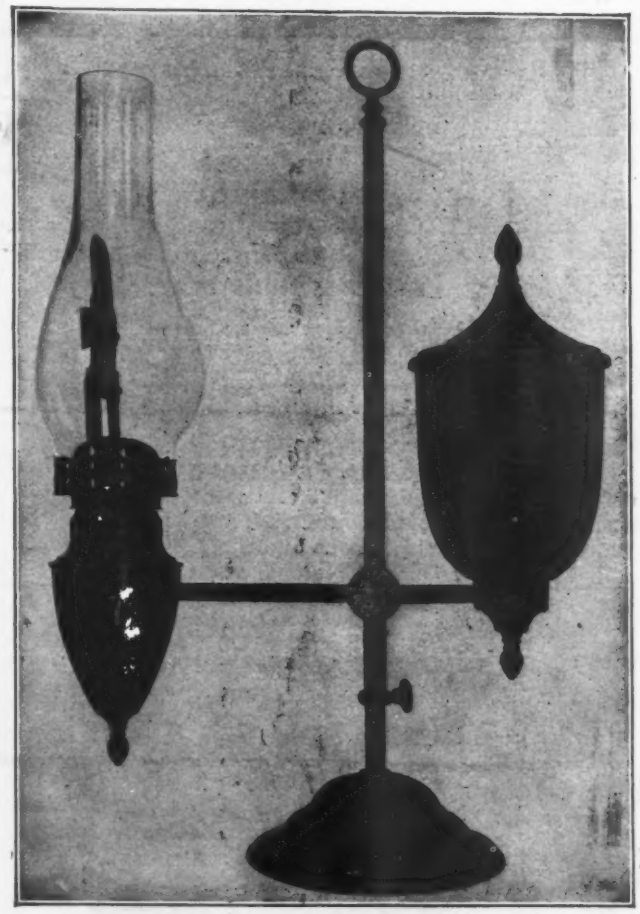
OCTOBER, 1907.

Day of Week.	Date.	Table No. 1. Following the Moon. Light.	Extinguish.
Tue.	1	6.10 PM	1.50 AM
Wed.	2	6.10	2.50
Thu.	3	6.10	5.00
Fri.	4	6.10	5.00
Sat.	5	6.10	5.00
Sun.	6	6.00 NM	5.00
Mon.	7	6.00	5.00
Tue.	8	6.00	5.00
Wed.	9	6.00	5.00
Thu.	10	6.00	5.00
Fri.	11	7.30	5.00
Sat.	12	8.20	5.00
Sun	13	9.20 FQ	5.10
Mon.	14	10.30	5.10
Tue.	15	11.30	5.10
Wed.	16	12.40 AM	5.10
Thu.	17	1.50	5.10
Fri.	18	3.00	5.10
Sat.	19	No L.	No L.
Sun.	20	No L FM	No L.
Mon.	21	No L.	No L.
Tue.	22	5.40 PM	7.20 PM
Wed.	23	5.40	7.50
Thu.	24	5.40	8.30
Fri.	25	5.40	9.10
Sat.	26	5.40	10.00
Sun.	27	5.30	10.50
Mon.	28	5.30 LQ	11.40
Tue.	29	5.30	12.40 AM
Wed.	30	5.30	1.40
Thu.	31	5.30	2.40

TOTAL HOURS DURING 1907.

By Table No. 1.

	Hrs.Min.
January	211.10
February	193.40
March	182.10
April	167.00
May	157.00
June	145.30
July	151.50
August	162.30
September	175.30
October	202.40
November	209.30
December	231.50
Total, yr.	2190.20



THE ELLIOTT KEROSENE STANDARD PHOTOMETER LAMP.

❋❋❋

10-Candle Power.

❋❋❋

This lamp is a perfect substitute for the 10-candle Pentane Lamp hitherto used, and has the following advantages:

1st. It uses Standard Kerosene Oil (Pratt's Astral Oil or equivalent).

2d. It is remarkably steady. Will burn 24 hours continuously with less than 2 per cent. variation.

3d. It is much less dangerous than Pentane, which is a kind of gasolene.

4th. It is not easily affected by air currents in the photometer room.

5th. Since the lamp may burn continuously, the candle power of gas may be taken at any moment, if necessary. This insures steady illuminating power without waste of carburetting material.

6th. The first cost of the lamp brings it within the reach of even small gas works.

7th. Costs much less to maintain than a Pentane lamp or sperm candles doing the same service.

8th. Is not affected by the weather.

PUBLIC LIGHTING TABLE.

OCTOBER, 1907.

Day of Week.	Date.	Table No. 2. New York City. All Night Lighting. Light	Extinguish.
		P. M.	A.M.
Tue.	1	5.30	5.00
Wed.	2	5.30	5.00
Thu.	3	5.30	5.00
Fri.	4	5.30	5.00
Sat.	5	5.30	5.00
Sun.	6	5.30	5.00
Mon.	7	5.30	5.00
Tue.	8	5.20	5.10
Wed.	9	5.20	5.10
Thu.	10	5.20	5.10
Fri.	11	5.20	5.10
Sat.	12	5.20	5.10
Sun.	13	5.20	5.10
Mon.	14	5.20	5.10
Tue.	15	5.10	5.20
Wed.	16	5.10	5.20
Thu.	17	5.10	5.20
Fri.	18	5.10	5.20
Sat.	19	5.10	5.20
Sun.	20	5.10	5.20
Mon.	21	5.10	5.20
Tue.	22	5.00	5.30
Wed.	23	5.00	5.30
Thu.	24	5.00	5.30
Fri.	25	5.00	5.30
Sat.	26	5.00	5.30
Sun.	27	5.00	5.30
Mon.	28	5.00	5.30
Tue.	29	4.45	5.35
Wed.	30	4.45	5.35
Thu.	31	4.45	5.35

TOTAL HOURS DURING 1907.

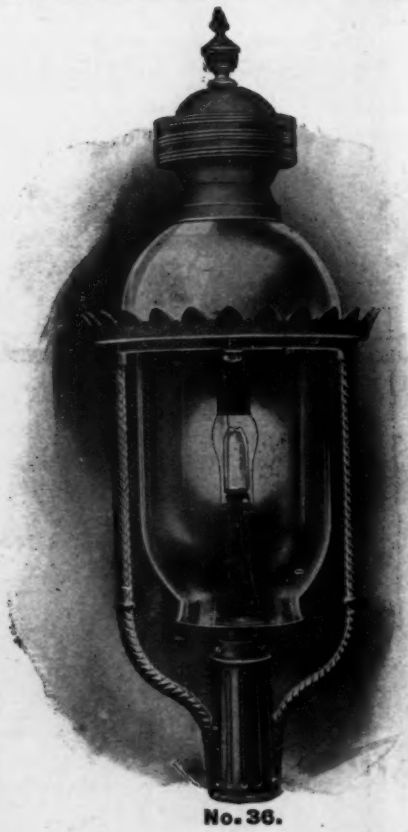
By Table No. 2.

	Hrs.Min.
January	423.20
February	355.25
March	355.35
April	298.50
May	264.50
June	234.25
July	243.45
August	280.25
September	321.15
October	374.30
November	401.40
December	433.45
Total, yr.	3987.41

NEW YORK, 318 West 42d Street.
BOSTON, 820 Beacon Building.
PHILADELPHIA, Broad and Arch Streets.
ST. LOUIS, 712 Roe Building.
CHICAGO, 218 La Salle Street.
SAN FRANCISCO, 512 Oak Street.

WELSBACH STREET LIGHTING COMPANY

....OF AMERICA....



No. 36.

Controls and Operates the **Welsbach System of Street Lighting,**

Which includes its specially DESIGNED and PATENTED BURNER for PARK LIGHTING exclusively.

Uniformly SUCCESSFUL in 150 Cities and Towns.

By means of the Welsbach System of street lighting the superiority of GAS over electricity for street lighting has been fully demonstrated.

POINTS OF MERIT:

It is { Economical, Attractive, Successful, Up-to-date.

IT LIGHTS THE STREET.

Where there are no gas mains we can furnish an equally good light by our SELF-GENERATING NAPHTHA WELSBACH BURNER, and thereby supply a uniform light in all localities.

Correspondence Solicited from Gas Companies and Others interested in Municipal and Outside Lighting.

No. 38.

INVERTED REFLEX TRADE MARK GAS LIGHT

Succeeds and Excels the Electric Light at One-Quarter the Cost.

THE BURNER.

Elegance of Appearance.
Best Possible Material and Workmanship.
Perfect Combustion.
Lowest Gas Consumption.
Highest Candle Power.
Will Fit Any Fixture.
Will Not Flash Back.
Will Not Blacken Mantles.
Will Not Discolor Fixtures.
Will Not Discolor Ceilings.

THE MANTLE.

Best Welsbach Quality.
Extra Strong and Durable.
Highest Maintained Candle Power.
Rich Mellow Light.

THE GLASSWARE.

Highest Quality Imported.
Special Design Inner Cylinder (No. 317).
Protection from the Falling of Heated Particles.
Increases Candle Power.

Manufactured by

WELSBACH COMPANY.

FACTORIES:

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Salesrooms in all leading cities of the United States.

WRITE FOR DISCOUNTS.

The United Gas Improvement Company,

Broad and Arch Streets, Philadelphia.

LESSEES, OPERATORS AND BUILDERS

OF

GAS WORKS.

LARGEST BUILDERS OF

CARBURETTED WATER GAS PLANT IN THE WORLD.

SOLE BUILDERS

OF THE

Standard Double-Superheater Lowe Water Gas Apparatus.

1907 CONTRACTS.

PARTIAL LIST OF PLACES:

Newburgh, N. Y.
Helena, Mont.
Bridgeport, Conn. (3d contract).
Suffolk, Va.
Winsted, Conn. (2d contract).
Nashua, N. H.
Augusta, Me. (2d contract).
Everett, Mass.
Jenkintown, Pa. (2d contract).
Coney Island, N. Y.
Mexico, Mo.
Jacksonville, Fla.
Syracuse, N. Y. (2d contract).
Atlanta, Ga. (3d contract).
Holyoke, Mass.
Peoria, Ills.
Schnectady, N. Y. (2d contract).
Danbury, Conn.
Galveston, Tex. (2d contract).
Quebec, Canada.
Indianapolis, Ind. (2d contract).
Bessemer, Ala.
Waterbury, Conn. (5th contract).
Sioux Falls, S. D. (3d contract).
Philadelphia, Pa.

TOTAL SETS INSTALLED TO JULY 1, 1907, ... 34
TOTAL SETS TO DATE, ... 668
TOTAL DAILY CAPACITY, ... 541,655,000 cu. ft.

Tar Extractors for Carburetted Water Gas.
Photometrical Apparatus.
Gas Analysis Apparatus.
Recording Gauges.
Straight Standpipe System for Coal Gas Retorts.
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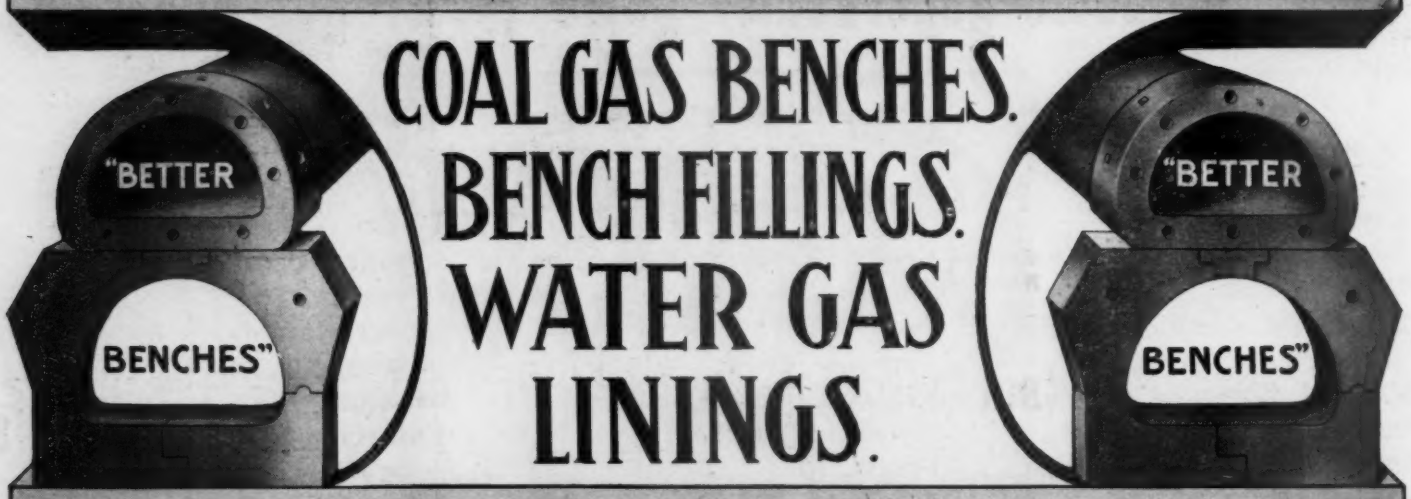

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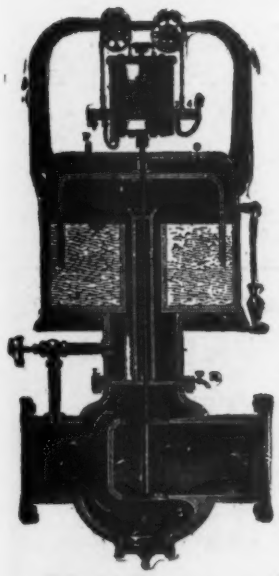

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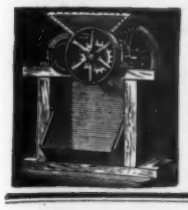

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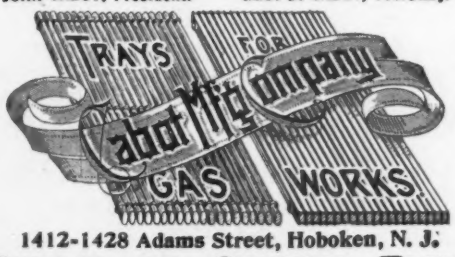

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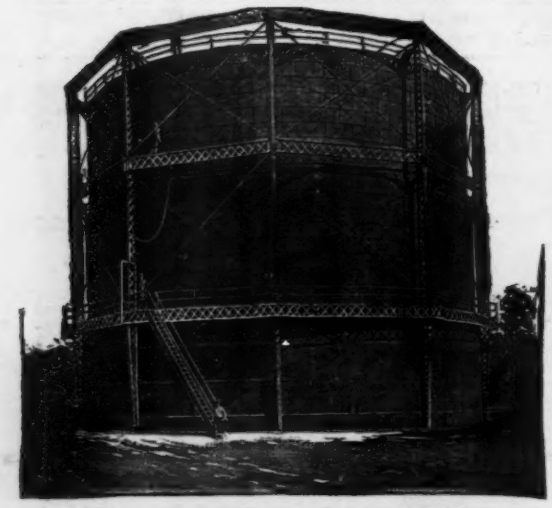

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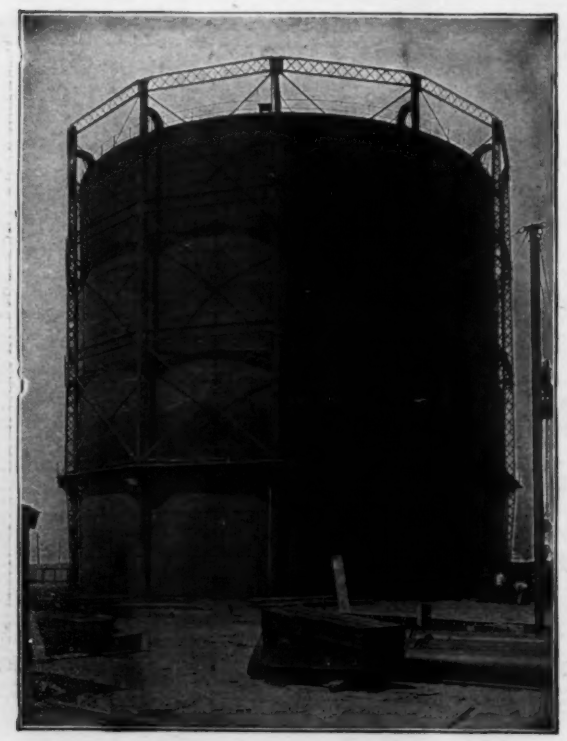

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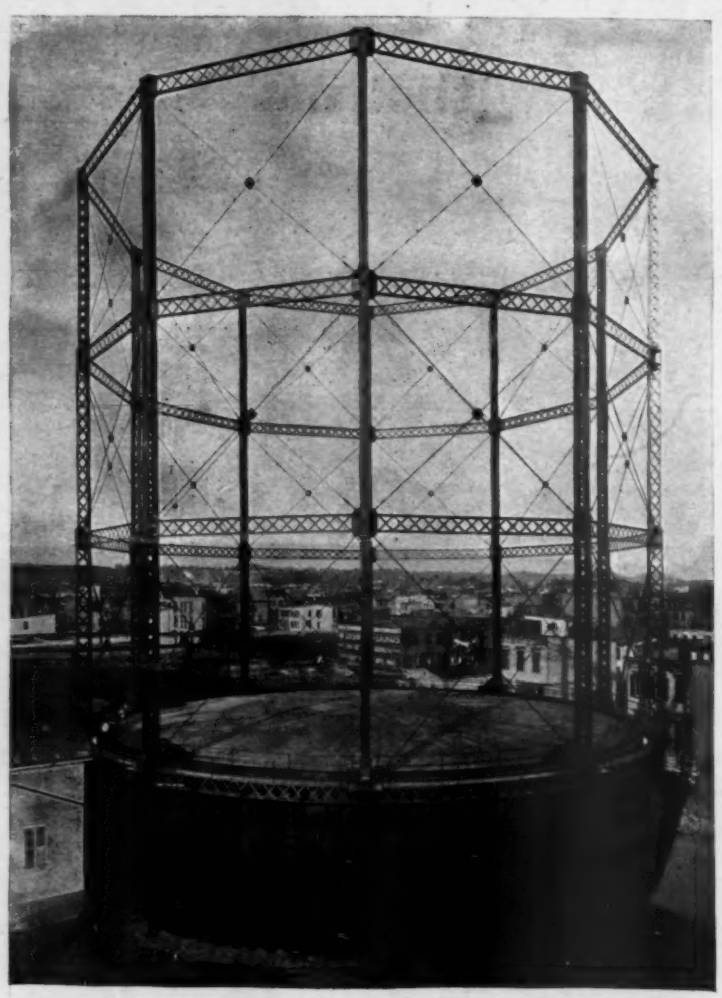

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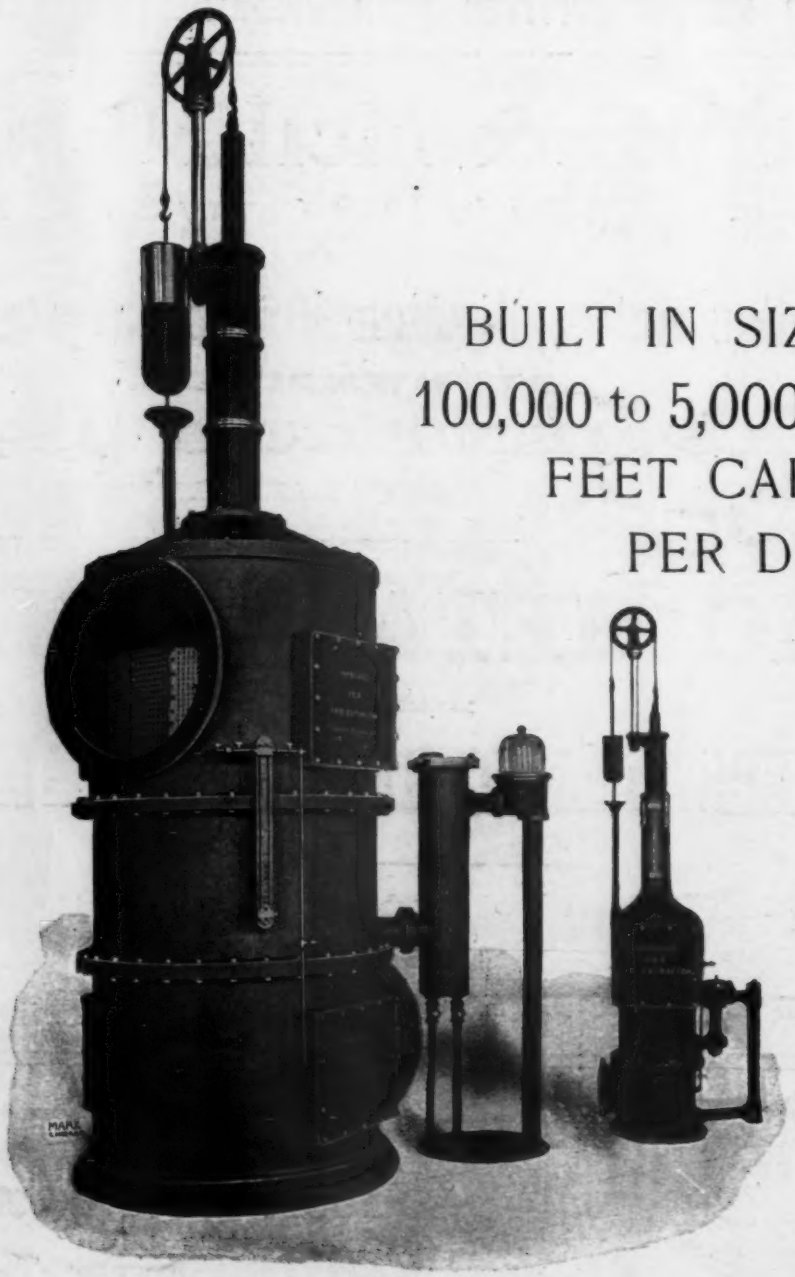

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